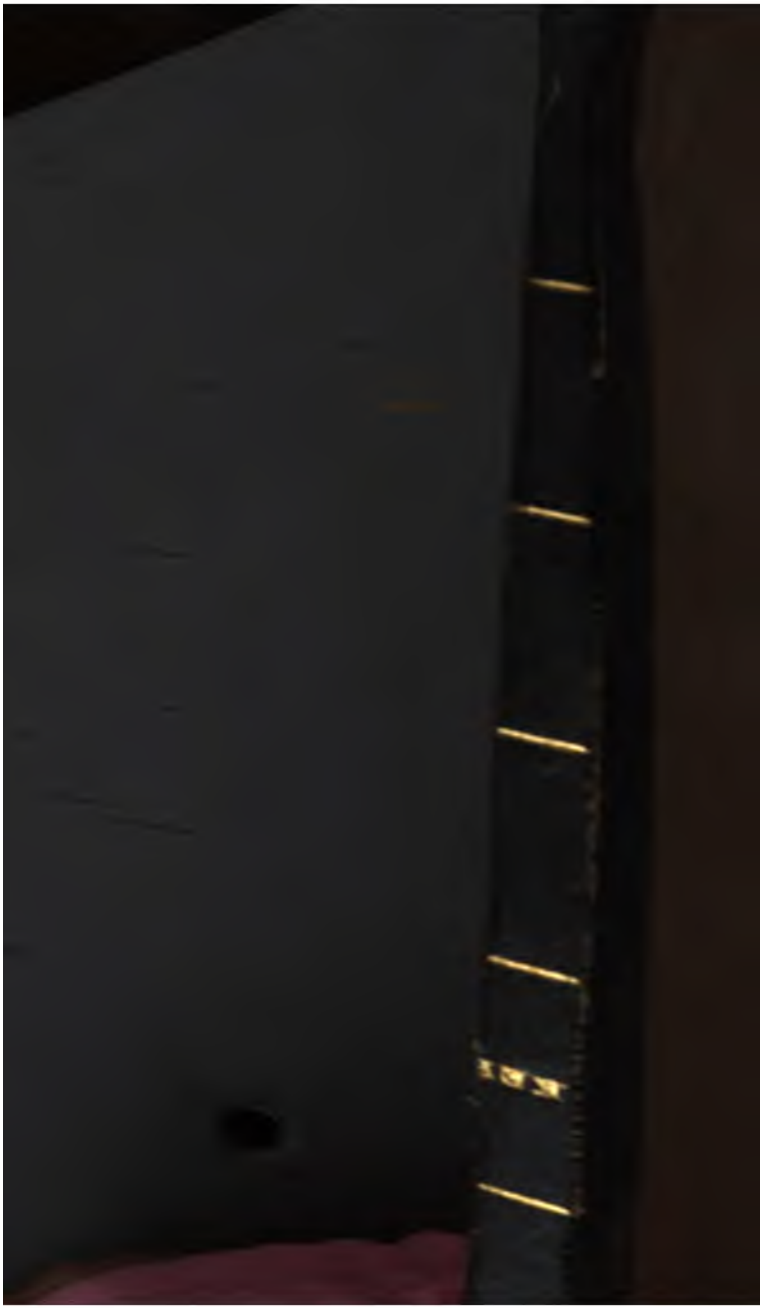
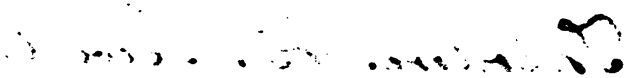


Theodore. H. Jewett



Theodore S. Gawett.

KEY,

CONTAINING

ANSWERS TO THE EXAMPLES

IN THE

SEQUEL TO

INTELLECTUAL ARITHMETIC.

BY WARREN COLBURN, A. M.

BOSTON:
PUBLISHED BY HILLIARD, GRAY & CO.
1833.

DISTRICT OF MASSACHUSETTS, TO WIT:

District Clerk's Office.

BE IT REMEMBERED, That on the eleventh day of May, A. D. 1827, in the fifty-first year of the Independence of the United States of America, HILLIARD, GRAY, LITTLE, AND WILKINS, of the said district, have deposited in this office the title of a book, the right whereof they claim as proprietors, in the words following, *to wit:*

"A Key, containing Answers to the Examples in the Sequel to Intellectual Arithmetic. By WARREN COLBURN, A. M."

In conformity to the act of the Congress of the United States, entitled, "An Act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies, during the times therein mentioned:" and also to an act, entitled, "An Act supplementary to an act, entitled, An Act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies during the times therein mentioned; and extending the benefits thereof to the arts of designing, engraving, and etching historical and other prints."

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THE Key contains the answers to all the examples in the Sequel; and occasional remarks, showing how to solve the questions, and how to use the book. Of course it is intended only for the use of instructers, and of those who wish to teach themselves. Great care will be taken to prevent improper persons from obtaining it. Those who wish for it must make personal application to the publisher.

KEY.

I.

Answers to the Examples in Art. 1

1. Twenty seven.
2. Thirty five.
3. Fifty eight.
4. Sixty three.
5. Seventy
6. Eighty four.
7. Ninety six.
8. One hundred.
9. One hundred and three.
10. One hundred and ten.
11. One hundred and thirteen.
12. One hundred and twenty seven.
13. Three hundred and eight.
14. Five hundred and twenty.
15. Seven hundred and thirty eight.
16. One thousand.
17. One thousand, and one.
18. One thousand, and ten.
19. One thousand, one hundred.
20. One thousand, and eighteen.
21. Two thousand, one hundred and seven.
22. Three thousand, two hundred and fifty.
23. Five thousand, seven hundred and ninety six.
24. Ten thousand.
25. Twenty thousand, and thirty.

26. Fifty thousand, seven hundred and five.
27. Sixty seven thousand, and eighty three.
28. Three hundred thousand, and fifty.
29. Four hundred and seventy six thousand, and eighty nine.
30. Seven hundred and seven thousand, seven hundred and twenty.
31. One million, three hundred and seventy.
32. Five millions, six hundred thousand, and seventy three.
33. Eight millions, eighty one thousand, three hundred and five.
34. Fifty nine millions, six thousand, three hundred and forty one.
35. Three hundred and five millions, eight hundred and seventy thousand, four hundred.
36. Five hundred and ninety millions, forty seven thousand, six hundred and eight.
37. One billion.
38. Three billions, six hundred and seventy millions, three hundred and eighty seven.
39. Forty five billions, seven millions, seventy thousand and seven.
40. Six hundred and eighty billions, nine hundred and thirty millions, one hundred thousand, seven hundred.
41. Fifty trillions, seven hundred and eighty seven billions, six hundred and fifty seven millions, five hundred.
42. Two hundred and seventy trillions, eight hundred and thirty eight millions, three thousand, nine hundred and eight.
43. Sixty eight millions, nine hundred and seven thousand, six hundred and five.
44. Fifty six billions, thirty four thousand, seven hundred and fifty.
45. Six trillions, seven hundred and three billions, seven hundred and twenty millions, eight hundred and fifty seven.

Answers to the numbers, to be written in figures.

1.	- -	34	19.	- -	500,071
2.	- -	57	20.	- -	207,600
3.	- -	63	21	-	4,060,084
4.	- -	80	22.	-	97,035,805.
5.	- -	100	23.	-	50,070,008
6.	-	101	24.	-	300,000,057
7.	- -	110	25.	-	2,053,305,200
8.	- -	311	26.	-	50,207,067,200
9.	- -	517	27.	-	87,000,063
10.	- .	850	28.	-	600,000,207,003
11.	- -	986	29.		35,000,009,000,058
12.	- -	1,001	30.		657,007,000,097,067
13.	- -	1,010	31.	-	70,250,367
14.	- -	3,101	32.		407,000,000,087,000
15.	- -	5,060	33.	-	35,000,098,100
16.	- -	10,005	34.	-	40,200,074
17.	- -	30,504	35.	-	83,763,957
18.	-	67,040			

II.

Addition.

1	-	79 dollars	12.	228 yards.	1,432 dollars
2.	-	85 trees	13	- -	814 guns
3.	- -	209 dollars	14.	- -	7,850 men
4.	- -	109 trees	15.	- -	537 pounds
5.	- -	365 days	16.	- -	8 dollars
6.	- -	1,387 miles	17.	- -	25 dollars
7.	- -	878 dollars	18.	- -	157 dollars
8.	- -	156 times	19.	- -	66 years
9.	-	506 dollars	20.	- -	66 years
10.	- -	5,919 dollars	21.	- -	531 dollars
11.	-	43,440 dollars	22.	- -	3,487 dollars

23.	2,716 years	29.	3,879,379 inhabitants
24.	A. D. 1783	30.	906,617 do.
25.	A. D. 1799	31.	9,625,734 do.
26.	2,358 years	32.	922,837
27	1,659,854 inhabitants	33.	9,726,064
28.	3,179,884 do.	34.	99,043,624

III.

Multiplication.

1.	54 dolls.	20.	696 gills
2.	78 dolls.	21.	252 quarts
3.	56 cents	22.	1,008 quarts
4.	85 cents	23.	504 pints
5.	95 dolls.	24.	1,008 pints
6.	141 dolls.	25.	2,016 gills
7.	120 dolls.	26.	8,064 gills
8.	104 dolls.	27.	34 quarts
9.	686 dolls.	28.	39 pints
10.	7,146 dolls.	29.	231 gals.
11.	513 trees	30.	756 quarts
12.	304 yds.	31.	791 pints
	2,128 dolls.	32.	6,927 gills
13.	2,713 dolls.	33.	403 dolls. 20 cents
14.	126 dolls.	34.	16 dolls. 59 cents
15.	756 dolls.	35.	2,352
16.	16 cents	36.	6,640
17.	1 quart 40 cents	37.	786,924
	1 gal. 1 dol. 60 cents	38.	19,896
18.	20 dolls. 16 cents	39.	5,743,066
19	174 pints	40.	65,260,340

IV.

1.	1,026 dolls.	27.	9,525
2.	1,218 dolls.	28.	33,318
3.	1,344 dolls.	29.	84,056
4.	1,455 dolls.	30.	140,192
5.	each 126 dolls.	31.	418,670
	whole 2,520 dolls.	32.	769,608
6.	2,100 dolls.	33.	34,650
7.	416 dolls.	34.	7,380
8.	1 year 1,664 dolls.	35.	55,824
	2 years 3,328 dolls.	36.	483,924
9.	168 hours	37.	2,163,942
10.	1,440 minutes	38.	196,112
11.	10,080 minutes	39.	8,001
12.	1,416 hours	40.	22,176
13.	504 miles	41.	116,397
14.	264 miles	42.	442 dolls.
15.	3,456 miles	43.	1,479 dolls.
16.	2,368 gallons	44.	20 dolls. 1 cent
17.	1,656 dolls.	45.	3 dolls. 64 cents
18.	525,960 minutes	46.	22 dolls. 42 cents
19.	832 days	47.	23 dolls. 31 cents
20.	in 24 h'rs 12,960 miles	48.	323
	in 15 days 194,400 m.	49.	703
21.	1,218	50.	2,438
22.	4,815	51.	4,794
23	7,408	52.	7,828
24.	4,950	53.	14,758
25.	3,024	54.	11,774
26.	50,568	55.	47,905

V.

1.	50 cents	3.	50 dolls. 40 cents
2.	120 dolls.	4.	70 days

5.	87 dolls. 30 cents	23.	50
6.	800 dolls.	24.	470
7.	2,700 dolls.	25.	300
8.	30 cents	26.	1,240
9.	50 dimes. 500 cents	27.	3,870
10.	1,700 cents	28.	4,500
11.	830 mills	29.	130,080
12.	75,300 cents	30.	700
13.	1,000 mills	31.	3,800
14.	84,000 mills	32.	9,000
15.	753 cents	33.	4,000
16.	18,314 cents	34.	73,000
17.	283,438 mills	35.	80,000
18.	8,246,256 mills	36.	132,000
19.	$45.30	37.	800,000
20.	$2.70	38.	1,643,000
21.	$815	39.	7,250,000
22.	$350	40.	764,380,000

VI.

1.	$15.00	12.	$105.00
2.	$202.50	13.	in 7 miles 2,240 rods in 10 miles 3,200 " in 30 miles 9,600 " in 500 m. 160,000 "
3.	$54,000		
4.	1,290 days		
5.	5,810 men		
6.	in an hour 3,600 times in a day 86,400 " in a week 604,800 "	14.	680
		15.	17,100
		16.	15,000
7.	623 seconds	17.	1,935,000
8.	443 minutes	18.	320,560
9.	4,783 minutes	19.	8,120,000
10.	718,459 seconds	20.	198,400,000
11.	$384,000	21	107,200,000

VII.

1.	- - -	$714	16.	- -	$2561.625
2.	-	$218.62	17.	- -	$107.125
3.	- -	$24.32	18.	- -	$5075.00
4.	- -	$636.48	19.	- -	$22,503.78
5.	- -	$478.50	20.	- -	$61,362.875
6.	- -	$565.50	21.	- -	$434,112.00
7.	- -	$139.20	22.	- -	- 41,689
8.	in 1 day	80 miles	23.	- -	1,575,000
	in 15 days	1,200 "	24.	- -	309,848
9.	- -	$932.75	25.	- -	15,105,150
10.	- -	$2702.90	26.	- -	103,804,200
11.	- -	$3053.74	27.	-	18,720,000,000
12.	- -	$1819.65	28.	-	216,004,605,056
13.	in 1 day	192 miles	29.	-	362,600,000,000
	in 127 d.	24,384 "	30.		23,552,810,540,300
14.	- -	$1,238,550	31.		30,271,411,995,340
15.	- -	$679,620			

Miscellaneous Examples.

1.	- -	$31.36	14.	- -	$13.296
2.	- - -	$3.36	15.	- -	66,705 grains
3.	- - -	$28	16.	- -	55,799 grains
4.	- - -	112 lb.	17.	- - -	$25.37
5.	- - -	10 qrs.	18.	- - -	$5.37
6.	- - -	102 lb.	19.	- - -	$10.53
7.	- - -	252 lb.	20.	- -	$537.50
8.	- - -	219 lb.	21.	- - -	$70.56
9.	- - -	288 oz.	22.	-	126,230,400 sec.
10.	- -	21,504 oz.	23.	-	261,171,837 sec.
11.	- -	26,680 oz.	24.	- -	42 months
12.	- - -	$36.72	25.	-	1713 days
13.	- - -	$34.12	26.	- -	165,936 min.

27. - - - ———
28. 57,497,947,200 sec.
29. - - $262.68
30. - - $1972.32
31. - 30,363,840 miles
32. - - 2268 men
33. - - 705 days
34. - - 7905 men
35. - - 522 hours
36. - - 2821 days
37. 1848 days / 3318 men
38. - - 108 yards
39. - - - $269
40. - 520 penny loaves
41. - - $731.74
42. - - - $51.43
43. - - - $0.78
44. - - - $2.58
45. - - - $7.85
46. for 2 years $0.12 / for 5 years $0.30
47. - - - $51.87
48. - - - $3000
49. - - $177.50
50. - - $324.50
51. on $5 $3.40 / on $20 $13.60
52. on $47, $34.31 / on $123, $89.79 / on $2500, $1825
53. gained $36.45 / sold them for $279.45
54. - - $1036.89

VIII.

Subtraction.

1. - - 5 peaches
2. - - - $6
3. - - 18 apples
4. - - - $19
5. - - - $29
6. - - - $48
7. - - 27 years
8. - - 37 years
9. - - 64 years
10. - - 48 yards
11. - - - $23
12. - - - $115
13. - - - $92
14. - - $666
15. - - $1236
16. - - 13 miles
17. - - 180 miles
18. - - 67 years
19. - - A. D. 1706
20. horses $466 / horses more than carriage $79
21 - - $3823
22. - - $11,608
23. - 80,428 inhabitants
24. - increase 10,098

25.	$114	37.	1,973
26.	$4562	38.	51,494
27.	$0.925	39.	159,997
28.	A received $4150.88	40.	$999
29.	$220.50	41.	$999.88
30.	he lost $151.20; he sold it for $1738.80	42.	800,047
		43.	159,930
31.	he spends $1193.55; he saves $642.45	44.	9,877
		45.	$840.86
32.	462,365	46.	80,547
33.	292,999	47.	$14,146.58
34.	36,996,329	48.	$1117.53
35.	8,844	49.	$999.99
36.	1,956		

IX.

Division.

1.	6 oranges	17.	11 yds.
2.	9 barrels	18.	33 lb.
3.	14 bushels	19.	61 qts.
4.	14 barrels	20.	£1 18s.
5.	$16	21.	£2 13s.
6.	21 pence	22.	£4 7s.
7.	13 lb.	23.	£5 15s.
8.	14 lb.	24.	£8 18s.
9.	17 lb.	25.	£12 13s.
10.	20 cwt.	26.	£312 7s.
11.	23 cwt.	27.	3s. 2d.
12.	19 cwt.	28.	12s. 9d.
13.	7 lb.	29.	123s. 10d.
14.	8 yds.	30.	2236s. 10d.
15.	4 oz.	31.	22d. 1qr.
16.	7 bushels	32.	60d. 3qr.

33. - - 941d.
34. - 2s. 10d. 1qr.
35. - 7s. 11d. 2qr.
36. - £1 10s. 10d.
37. - £3 10s. 6d.
38. - £16 1s. 6d.
39. - £2 8s. 9d.
40. - £90 17s. 9d. 1qr.
41. - 10 gals. 3 qts. 1 pt.
42 - 28 gals. 3 qts.
43. - 12 qts. 2 gls.
44. 5 gals. 2 qts. 1 pt. 3 gls.
45 131 gals. 3 qts. 1 gill
46. - 745 gals. 3 qts.
47. - 2 hhds. 22 gals.
48. 15 T. 1 hhd. 30 gals.
49. 6 T. 12 gals. 2 qts.
50. - - 14 min. 33 sec.
51. 3 days 15 hours
52. 2mo. 2 w. 3 d.
53. - 1 d. 21 h. 38 min.
54. - - 10 mo. 1 w.
55. - - 16 y. 24 d.
56. - 1 lb. 1 oz. 1 dr.
57. 19 lb. 13 oz. 7 dr.
58. - - - 1 ton
59. 156 T. 1 cwt. 0 qr. 2 lb. 6 oz.
60. 16 dwt.
61. 16 oz. 5 dwt.
62. 35 lb. 11 oz.
63. 34 lb. 5 oz. 19 dwt. 10 gr.
64. 117 lb. 9 oz. 7 dwt. 10 gr.
65. 2 yds. 1 qr. 1 nl.
66. 4 E. Eng. 1 qr. 3 nls.
67. 15 yds. 0 qr. 3 nls.
68. 124 E. Flem.
69. 258 E. Flem. 2 qr. 3 nls.
70. 15 guineas 12s.
71. 11 six-pences and 2d. over
72. 16 eight-pences and 2d. over
73. 85 four-pences and 2d. over
74. 231 nine-pences and 7d. over
75. 1938d.
76. 329 three-pences.
77. £121 0s. 9½d.
78. 42 guineas, and 24s. 1d. over
79. 240 three-pences

80. 243 dolls. and 2s. over
81. 80 guineas
82. 124 dollars
83. 72d.
84. 5 dolls. and 1s. 10d. over
85. 108 dolls. and 4d. over
86. 17 E. Flem. 1 qr.
87. 2 E. Eng. 1 qr.
88. 10 aunes 1 qr.
89. 91 yds. 1 qr.
90. In a little more than 26 days
91. £9 2s. 6d.
92. 50 spoons and 8 dwt. over
93. 3lb. 3 oz.
94. 27 coats
95. 168 bottles
96. 144 of each kind
97. 7 of each sort
98. 15 of each sort
99. 23 bushels of each sort.
100. - 36 of each sort
101. - - 2840 boxes
102. - - 329 qqls.
103. - - 24 barrels
104. - - 30 bushels
105. - - 348 lb.
106. - - 7yds.
107. - - 856 times
108. - - 4291 times
109. - - 9604 times
110. - - 290 times
111. - - 3669 times
112. - 16,212 times
113. - 11,807 times
114. - - 5337 times
The dividend in this example should have been 80,055
115. - - 731 times
116. - - 52 times
117. - - 37 times
118. - - 33 times
119. - - 94 times
120. - - 38 times
121. - - 75 times
122. - - 29 times
123. - - 365 times
124. - - 826 times

125. - - 9405 times
126. - - 7638 times
127. - 134,092 times
128. - 1,003,245 times

Miscellaneous Examples.

1. - - 12s. 9d.
2. - - - 9s.
3. - - 10s. 6d.
4. - - £1 4s. 9d.
5. - - £2 13s.
6. - - £7 6s. 8d.
7. - - £20 10s.
8. - - - £21
9. - 1 qr. 15 lb. 5. oz.
10. - - £24 3s.
11. - - £10 8s. 4d.
12. 7 cwt. 3 qrs. 11 lb.
13. 14 cwt. 3 qrs. 13 lb.
14. 19 cwt. 3 qrs. 8 lb.
15. 58 cwt. 1 qr. 20 lb.
16. - - £6 12s.
17. - £28 0s. 0d.
18. - - £7 16s. 4d.
19. - - £2 13s. 4d.
20. - - £4 17s. 9d.
21. - - £11 7s. 6d.
22. - - £36 16s. 8d.
23. - per lb. £4 1s.
for the whole £10 9s. 3d.
24. - - £88 0s. 8d.
25. - - 12s. 9d.
26. - - 2 lb. 9 oz.
27. - - 1 T. 18 cwt.
28. - - £13 11s. 4d.
29. - 51 gals. 1 qt. 1 pt.
30. - 83 yds. 3 qrs. 1 nl.
31. 47 bu. 3 pks. 4 qts.
32. - - £7 17s. 8d.
33. 17 cwt. 3 qrs. 25 lb.
34. - 15 yds. 2 qrs.
35. - - 45 gals. 1 qt.
36. - - - 2s. 3d.
37. - - - £9 1s.
38. - - 7 yds. 3 qrs.
39. - - 14 yds. 2 qrs.
40. - - 8 lb. 13 oz.
41. - . 11s. 9d. 2qr.
42. - - £1 3s. 4d.
43. - 9 cwt. 1 qr. 15 lb.
44. - 43 cwt. 1 qr. 24 lb.
45. - 3 cwt. 2 qrs. 12 lb.
46. 23 yds. 1 qr. 2 nls.
47. - 7 yrs. 9 mo. 1 d.
48. - 8th March 1815
49. 4th June, 0 h. 36 min. 34 sec.

X.

1. $1
2. $1
3. $125 will buy $62\frac{1}{2}$ lb.
4. $\frac{1}{3}$ bu. will cost 1s. $\frac{2}{3}$ bu. will cost 2s.
5. $28 will buy $9\frac{1}{3}$ bbls.
6. $41\frac{3}{4}$ boxes
7. $226\frac{2}{3}$ bottles
8. $1, $2, $3
9. $\frac{1}{4}$ &c., $4\frac{3}{4}$ boxes
10. $81\frac{3}{4}$ barrels
11. $1, $2, &c.
12. $\frac{1}{8}$ &c., $7\frac{4}{8}$ weeks
13. $90\frac{3}{8}$ bbls.
14. $1, $2, $5, $7, $11
15. for $56, $9\frac{2}{6}$ reams
16. $72\frac{5}{6}$ bbls.
17. from Boston to New-York in $35\frac{4}{7}$ hours
18. $9\frac{3}{8}$ chaldrons
19. $50\frac{3}{5}$ reams
20. $347\frac{4}{5}$ bbls.
21. $425\frac{2}{5}$ bbls.
22. $106\frac{5}{8}$ cords
23. $5\frac{15}{17}$ lb. $11\frac{13}{17}$ lb. $52\frac{3}{17}$ lb.
24. $\frac{1}{25}$ cwt. $\frac{3}{25}$ cwt. $\frac{8}{25}$ cwt. $\frac{18}{25}$ cwt. $95\frac{13}{25}$ cwt.
25. $15\frac{7}{28}$ tons
26. $\frac{1}{32}$, $\frac{3}{32}$, $\frac{7}{32}$, $\frac{14}{32}$, $\frac{27}{32}$, $2\frac{3}{32}$, $26\frac{1}{32}$
27. $38\frac{43}{48}$ gals. for $17.53
28. $\frac{1}{138}$ T. $\frac{17}{138}$ T. $\frac{35}{138}$ T. $\frac{87}{138}$ T. $\frac{114}{138}$ T. $6\frac{47}{138}$ T. $199\frac{33}{138}$ T.
29. $\frac{1}{875}$ &c., $10\frac{474}{875}$ bbls.

30.	-	-	$47\frac{2}{15}$ galls.	33.	-	-	$199\frac{36}{125}$ days
31.	-	-	$34\frac{17}{275}$ cwt.	34.	-	-	- $66\frac{1}{2}$ lb.
32.	-	-	$22\frac{96}{125}$ days	35.	-	-	$32\frac{1}{2}$ bushels

36. - - $48\frac{11}{23}$ lb.
37. - - $15\frac{1}{3}$ bushels
38. - - $37\frac{5}{6}$ gals.
39. - - $6\frac{15}{83}$ hours
40. $\frac{1}{81}$ bu. $\frac{9}{91}$ bu. $\frac{12}{21}$ bu. $13\frac{13}{91}$ bu.
41. - - - $41\frac{24}{100}$ gals.
42. - - - $74\frac{108}{136}$ gals.
43. - - - $22\frac{603}{780}$ bbls.
44. - - - - $196\frac{1}{4}$
45. - - - - $359\frac{1}{8}$
46. - - - - $9407\frac{1}{9}$
47. - - - - $204\frac{8}{14}$
48. - - - $1559\frac{5}{26}$
49. - - - - $354\frac{35}{78}$
50. - - - $5782\frac{27}{183}$
51. - - - - $415\frac{214}{437}$
52. - - - $399\frac{274}{2467}$
53. - - - $123\frac{6097}{13841}$
54. - - - $1011\frac{1091139}{4030006}$
55. - - - $8014\frac{13098}{12478}$

XI.

1. - - $8\frac{7}{10}$ lb.
2. - - $35\frac{4}{10}$ lb.
3. - - - 16 lb.
4. - - $24\frac{3}{10}$ boxes
5. - - $74\frac{9}{10}$ chald.
6. - - $43\frac{73}{100}$ bu.
7. - $324\frac{87}{100}$ boxes
8. - - $243\frac{84}{100}$ lb.
9. - - $24\frac{763}{1000}$ bbls.
10. - - $87\frac{3984}{10000}$ tons
11. - - - $7\frac{8}{16}$
12. - - - $387\frac{6}{10}$
13. - - - $4\frac{73}{100}$
14. - - - $67\frac{83}{100}$
15. - - $487\frac{68}{100}$
16. - - $4753\frac{84}{100}$
17. - - $5710\frac{648}{1000}$
18. - $176487\frac{4}{10}$ cts.
$17648\frac{74}{100}$ d.
$1764\frac{874}{1000}$
19. - - $4710\frac{74}{1000}$

XII.

1 - - - - $\frac{1}{2}$ - - - $\frac{1}{7}$
2. - - - - $\frac{1}{4}$ - - - - $\frac{1}{4}$

No.	Answer	No.	Answer
5.	$\frac{7}{4}$	39.	$\frac{1}{32}$ gal.
6.	$\frac{10}{7}$	40.	$\frac{7}{32}$ gal.
7.	$\frac{9}{17}$	41.	$\frac{23}{32}$ gal.
8.	$\frac{17}{9}$	42.	$\frac{1}{63}$ hhd. $\frac{17}{63}$ do.
9.	$\frac{17}{35}$	43.	$\frac{1}{2016}$ hhd. $\frac{43}{2016}$ do.
10.	$\frac{34}{17}$	44.	$\frac{574}{2016}$ hhd.
11.	$\frac{8}{67}$	45.	$\frac{1}{28}$ qr. $\frac{13}{28}$ qrs.
12.	$\frac{67}{8}$	46.	$\frac{1}{16}$ lb. $\frac{11}{16}$ lb.
13.	$\frac{37}{103}$	47.	$\frac{1}{256}$ lb. $\frac{14}{256}$ lb.
14.	$\frac{103}{17}$	48.	$\frac{219}{256}$ lb.
15.	$\frac{39}{256}$	49.	$\frac{1}{7168}$ qr. $\frac{43}{7168}$ qr.
16.	$\frac{246}{39}$	50.	$\frac{4434}{7168}$ qr.
17.	$\frac{138}{287}$	51	$\frac{1}{12}$ yr. $\frac{7}{12}$ yr. $\frac{11}{12}$ yr.
18.	$\frac{3472}{38649}$	52.	$\frac{1}{30}$ mo. $\frac{3}{30}$ mo. $\frac{17}{30}$ mo.
19.	$\frac{3906}{907384}$	53.	$\frac{1}{60}$ h. $\frac{17}{60}$ h.
20.	$9\frac{644}{384}3$	54.	$\frac{1}{1440}$ day, $\frac{13}{1440}$ day
21.	$\frac{1}{4}$d. $\frac{2}{4}$d. $\frac{3}{4}$d.	55.	$\frac{463}{1440}$ day
22.	$\frac{1}{12}$s. $\frac{2}{12}$s. $\frac{3}{12}$s. &c. $\frac{11}{12}$s.	56.	$\frac{1}{86400}$ day, &c.
23.	$\frac{1}{48}$s. $\frac{2}{48}$s. $\frac{3}{48}$s. &c. $\frac{45}{48}$		$\frac{848}{86400}$ day
24.	$\frac{7}{48}$s. $\frac{9}{48}$s. $\frac{31}{48}$s.	57.	$\frac{49437}{86400}$ day
25.	$\frac{1}{20}$£, $\frac{2}{20}$£, &c. $\frac{17}{20}$	58.	$\frac{1}{31557600}$ yr.
26.	$\frac{1}{240}$£, $\frac{2}{240}$£, &c. $\frac{147}{240}$£		$\frac{8784}{31557600}$ yr.
27.	$\frac{29}{240}$£	59.	$\frac{10691005}{31557600}$
28.	$\frac{88}{240}$£	60.	$\frac{1}{99}$, $\frac{8}{99}$, $\frac{40}{99}$
29.	$\frac{164}{240}$£	61.	$\frac{63}{201}$
30.	$\frac{217}{240}$£	62.	$\frac{43}{100}$ dol.
31.	960 qrs.	63.	$\frac{72}{300}$ dol.
32.	$\frac{1}{960}$£, $\frac{2}{960}$£, &c. $\frac{417}{960}$£	64.	$\frac{1}{60}$£ $\frac{17}{60}$£
33.	$\frac{31}{960}$£	65.	$\frac{1}{1200}$, $\frac{11}{1200}$, $\frac{86}{1200}$
34.	$\frac{49}{960}$£	66.	$\frac{162}{1052}$
35.	$\frac{221}{960}$£	67.	$\frac{860}{3221}$
36.	$\frac{645}{960}$£	68.	$\frac{1}{12}$
37.	$\frac{1}{4}$ gal.	69.	$\frac{31}{85}$
38.	$\frac{1}{8}$ gal.	70.	$\frac{79}{821}$

71. - - - $\frac{3}{11}$
72. - - - $\frac{5}{2520}$
73. - - - $\frac{31}{495}$
74. - - - $\frac{37}{7992}$
75. - - - $\frac{33}{341}$
76. - - - $\frac{35}{99}$
77. - - - $\frac{31}{265}$
78. - - - $\frac{4}{7}$
79. - - - $\frac{5}{8}$
80. - - - $\frac{9}{11}$
81. - - - $\frac{28}{9}$
82. - - - $\frac{24}{117}$
83. - - - $\frac{204}{97}$
84. - - - $\frac{943}{3773}$

In taking the ratio of one number to another, some make the first mentioned number the numerator. I have preferred the method given, because it is the one used by Lacroix. It is not important which is used, provided it be understood.

XIII.

1. It will take $\frac{4}{3} = 1\frac{1}{3}$ bbls. to last 4 weeks, and $\frac{17}{3} =$ $5\frac{2}{3}$ bbls. to last 17 weeks
2. It will take $\frac{11}{7} = 1\frac{4}{7}$ bbl. to last 11 weeks, and $\frac{28}{7}$ = 4 bbls. to last 28 weeks
3. - $\frac{11}{7} = 1\frac{4}{7}$; $\frac{28}{7} = 4$
4. $\frac{47}{13} = 4\frac{5}{13}$ chaldrons
5. - - - $4\frac{5}{13}$
6. - - - $3\frac{12}{17}$ bu.
7. - - - $3\frac{12}{17}$
8. - - - £$19\frac{7}{20}$
9. - - - £19 7s.
10. - - - 36$\frac{4}{20}$
11. - - 36s. 5d.
12. - - - $8\frac{6}{19}$ lb.
13. - - 8 lb. 6 oz.
14. - - $11\frac{14}{21}$ guin.
15. - 11 guin. 14s.
16. - - $19\frac{3}{14}$ days
17. - - 19 d. 20 h.
18. - - $162\frac{17}{60}$ hours
19. - 162 h. 17 min.
20. - $120\frac{42}{365}$ years
21. - - 120 yr. 42 d.
22. - $254\frac{333}{1461}$ years
23. - - - $10\frac{37}{77}$
24. - - - $100\frac{3}{17}$
25. - - - $47\frac{11}{14}$
26. - - $740\frac{2240}{2431}$

XIV.

1. 7 days, 21 days, 91 days
2. $1 = \frac{7}{7}$, $3 = \frac{21}{7}$, $13 = \frac{91}{7}$
3. 8 days, 57 days, 107 days, 349 days
4. $1 = \frac{8}{8}$, $7\frac{1}{8} = \frac{57}{8}$, $13\frac{3}{8} = \frac{107}{8}$, $43\frac{7}{8} = \frac{349}{8}$
5. 34 weeks, 202 weeks
6. $13\frac{7}{15} = \frac{202}{15}$
7. 402 men, 2486 men
8. - - - $\frac{4}{17}$
9. - - - $\frac{24}{25}$s.
10. - - - $1\frac{13}{20}$ bu.
11. - - $\frac{19}{117}$ bbls.
12. - $\frac{7}{12}$s. or 53d.
13. - $\frac{107}{20}$£, or 167s.
14. - - $\frac{171}{24}$ day
15. - - 371 hours
16. - - - $\frac{14}{16}$s.
17. - - 1063 min.
18. - - $\frac{221}{112}$ cwt.
19. - - - 821 lb.
20. - - $\frac{43}{237}$ cwt.
21. - - - $\frac{3}{44}$s.
22. - - - $\frac{4}{11}$
23. - - - $\frac{1}{1067}$

XV.

1. - - - $4\frac{1}{2}$
2. - - - $6\frac{3}{7}$ bu.
3. - - - $37\frac{1}{5}$ bbls.
4. - - $17\frac{2}{5}$ tons
5. - - - $2\frac{9}{20}$
6. - - - $6\frac{6}{17}$
7. - - - $6\frac{9}{20}$
8. - - - $24\frac{9}{25}$
9. - - - $21\frac{11}{20}$
10. - - $60\frac{8}{100}$
11. - - $261\frac{45}{100}$
12. - - - $37\frac{1}{2}$
13. - - - $108
14. - - - $330\frac{1}{2}$
15. - - £28 $11\frac{6}{17}$s.
16. - - £62 $5\frac{3}{4}$s.
17. - - £16$\frac{17}{21}$
18. - - £35$\frac{24}{47}$
19. - - - $31\frac{1}{2}$
20. - - $57\frac{6}{17}$, $117
21. - - $206\frac{4}{100}$
22. - - $573\frac{44}{100}$
23. - - - $2\frac{6}{17}$
24. - - - $1\frac{101}{111}$

25.	- - - $2\frac{96}{275}$	29.	- - - $1\frac{1170}{2878}$
26.	- - - $1\frac{1407}{2868}$	30.	- - - $1\frac{9679}{18405}$
27.	- - - $\frac{7525}{17834}$	31.	- - $59\frac{5283}{17063}$
28.	- - - $5\frac{32636}{48638}$	32.	- - $5\frac{757629}{1893700}$

XVI.

1.	- - - $12	23.	$\frac{1}{8}$ of $60.24, $7.53
2.	- $\frac{1}{3}$ of $36, $12	24.	$\frac{1}{12}$ of $82.44, $6.87
3.	- $\frac{1}{7}$ of $1.54, $0.22	25.	$\frac{1}{18}$ of $1692.00 $94
4.	- $\frac{1}{9}$ of $126, $14	26.	$\frac{1}{37}$ of $2.96 $0.08
5.	- $\frac{1}{17}$ of $136, $8	27.	$\frac{1}{63}$ of $52.92, $0.84
6.	- - - $163	28.	- - $427.42
7.	captain $4620	29.	- - 63,360 in.
	1st mate $3080	30.	- 21,600 geo. miles
	2d mate $2310	31.	- - 24,912 miles
	sailors $539 each	32.	- 950,400 in.
8.	- - 285 miles	33.	- 7,971,840 rods
9.	- - $13.64	34.	4,735,272,960 b. corns
10.	- - - $11.73	35.	- - - $1.25
11.	- $0.61, $1.22	36.	$\frac{1}{6}$ of 18 bu. $\frac{5}{6}$ of 18 bu.
12.	- - $31.33		15 bu.
13.	- - - $0.48	37.	in 53 h. 265 miles
14.	$1.05, $3.15, $7.35	38.	- - 1480 miles
15.	- $1.65, $17.05	39.	- - - $222
16.	- $1.50, $26.25	40.	- - 235 miles
17.	$1.55, $3.10, $4.65	41.	$1.43; $90.09; $294.58
18.	- - $23.20	42.	- - $191.70
19.	- - - 14.10	43.	- - - $7.05
20.	- - $1.13, $5.65	44.	- - $63.52
21.	- - $148.03	45.	- - £3 11s 4d.
22.	- $\frac{1}{7}$ of $2.94, $0.42	46.	- - $99.25

47. - - 55 bu. 1 pk. 53. - - $11.20
48. - - - £213 54. - - $13,625\frac{140}{168}$
49. - - - $56 55. 7167 & a fraction over
50. - - - $93.75 56. - - - $64,984\frac{720}{1170}$
51. - - - $220 57. - $\frac{1}{5}$ bu. $\frac{2}{5}$ bu.
52. - - £17 14s. 9d. 58. - - $\frac{1}{8}$ bu. $\frac{3}{8}$ bu.
59. $\frac{1}{2}$ gal. $\frac{2}{3}$ gal. $\frac{3}{4}$ gal. $1\frac{4}{5}$ gal.
60. $\frac{1}{2}$; $\frac{2}{3}$; $\frac{3}{4}$; $\frac{7}{5} = 1\frac{2}{5}$
61. $\frac{1}{7}$ $\frac{2}{7}$; $\frac{6}{7}$; $\frac{10}{7} = 1\frac{3}{7}$ dolls.
62. $\frac{1}{7}$; $\frac{3}{7}$; $\frac{4}{7}$; $\frac{10}{7} = 1\frac{3}{7}$
63. $\frac{1}{13}$ gal. $\frac{2}{13}$ gal. &c. $\frac{23}{13} = 1\frac{10}{13}$ gal. $\frac{47}{13} = 4\frac{5}{13}$ gals.
64. $\frac{1}{13}$; $\frac{2}{13}$, &c. $\frac{47}{13} = 4\frac{5}{13}$
65. $\frac{1}{23}$dol. $\frac{2}{23}$dol. &c. $\frac{34}{23} = 1\frac{11}{23}$, $\frac{87}{23} = 3\frac{18}{23}$dols. $\frac{253}{23} = 11$ dols.
66. $\frac{1}{23}$, $\frac{2}{23}$, &c. $\frac{87}{23} = 3\frac{18}{23}$, $\frac{253}{23} = 11$
67. $\frac{53}{8} = \$6\frac{5}{8}$; $\$86.12\frac{4}{8}$
68. $8\frac{7}{17}$ cts.
69. $\$6.31\frac{14}{17}$
70. $\$66.92\frac{7}{171}$
71. $\$532.83\frac{15}{63}$
72. $\$856.66\frac{128}{189}$
73. $\frac{2}{3}$ bu. $3\frac{1}{3}$ bu.

In doing these examples, make the pupil learn to *express* division, as explained in the book, Part II. Art. XVI.

74. $\frac{4}{5}$ bbl. $10\frac{4}{5}$ bbls.
75. $\frac{5}{23}$ bbl. $16\frac{7}{23}$ bbls.
76. $\frac{3}{43}$ acre, $\frac{21}{43}$ acre, $1\frac{41}{43}$ acre, $10\frac{29}{43}$ acres
77. $\frac{405}{256}$ pk. $\frac{405}{256}00 = 1706\frac{256}{256}$ pks. $= 426$ bu. $2\frac{256}{256}$ pks.
78. $\frac{97}{136}$ rood. $\frac{97}{136} \times 500 = \frac{1850}{136} = 136\frac{4}{136}$ roods $= 34$ acres, $0\frac{4}{136}$ roods.
79. 1 man will consume $\frac{96}{4335}$ bbl. and $\frac{96}{4335} \times 2426 = 535\frac{171}{4335}$ bbls. Or 1 man will consume $\frac{1}{4335}$ of 96 bbls. and 2426 men will consume $\frac{2426}{4335}$ of 96 bbls.

Ans. $535\frac{171}{4335}$ bbls.

80. - - - $5.43¾
81. - - - $12.54⅓
82. - - - 12s.
83. - - - 9d.
84. - - - 7¾d.
85. - - - 2½ qrs.
86. - - - 7½d.
87. - - 6d. 3¾ qrs.
88. - - - 7s. 6d.
89. - 14s. 3d. 1¼ qrs.
90. - 4s. 3d. 1½ qrs.
91. 13 h. 42 min. 51⅓ sec.
92. - 22 min. 30 sec.
93. 9 h. 13 min. 50⅛ sec.
94. 6 h. 43 min. 12 sec.
95. - - - - 6 oz.
96. - - 2 qrs. 8 lb.
97. 1 qr. 4 lb. 15$\frac{1}{17}$ oz.
98. - 17 galls. 2 qts.
99. 8 galls. 2 qts. 1 pt. 2$\frac{3}{23}$ gills.
100. - 2 qrs. 1$\frac{1}{7}$ nls.
101. - 3 qrs. 1$\frac{1}{11}$ nl.
102. - 1 qr. 1$\frac{1}{11}$ nl.
103. - - 0.428\frac{4}{7}$
104. - - 0.178\frac{6}{33}$
105. - - 0.127\frac{3}{22}$
106. - 7s. 9d. 3$\frac{5}{13}$ qrs.
107. - 7s. 6d. 3$\frac{9}{17}$ qrs.
108. - - 9s. 7$\frac{5}{13}$d.
109. 1 qt. 1 pt. 3$\frac{7}{31}$ gills.
110. - - - 6$\frac{6}{35}$d.
111. - - 16 hours
112. - - $0.20
113. - - 3$\frac{3}{13}$ qrs.
114. - 1 pk. 5$\frac{7}{23}$ qts.
115. - 7 oz. 12$\frac{3}{31}$ dr.
116. - 5s. 3d. 1$\frac{2}{31}$ qrs.
117. 12s. 9$\frac{30}{130}$ d.
118. 8s. 6d. 3$\frac{13}{31}$ qrs.
119. 1 qr. 5 lb. 11 oz. 15$\frac{7}{31}$ drs.
120. 2 d. 16 h. 8 min. 17$\frac{9}{137}$ sec.
121. 22 gals. 3$\frac{42}{64}$ qts.
122. In this example find $\frac{33}{477}$ of a hhd. in galls. and then multiply the price of 1 gall. by it; or first find the price of 1 hhd. and take $\frac{33}{477}$ of that. The latter method is generally preferable. *Ans.* 37.85\frac{72}{477}$.
123. 8.10\frac{10}{642}$
124. $350.
125. 63.66\frac{13}{31}$
126. 260.06\frac{1}{3}$
127. 2174.88\frac{16}{43}$
128. 4231.65\frac{21}{33}$

129. 4 bushels will come to 20s. then 3 pks. 5 qts. = 29 qts. = $\frac{29}{32}$ bu. $\frac{29}{32}$ of 5s. = 4s. $6\frac{13}{32}$d. *Ans.* £1 4s. $6\frac{13}{32}$d.

130. 3 cwt. will come to $27; 2 qrs. 7 lb. = $\frac{63}{112}$ cwt $\frac{63}{112}$ of $9 = $5.06\frac{38}{112}$ *Ans.* 32.06\frac{38}{112}$

131. $1348.50

132. $28.86\frac{228}{252}$

133. $\frac{747}{4432}$d. per grain. This multiplied by the number of grains in an ounce will give the price of an ounce. Ans. 6s. $8\frac{4800}{4432}$d.

134. 1.19\frac{7501}{100421}$

135. Reduce the 34 tons, &c. to pounds, and make it the denominator, and $6500.00 the numerator of a fraction; this will be the price of 1 pound in parts of a cent. Multiply this by the number of pounds in a ton, and reduce it, and it will be the answer. Ans. 188.49\frac{6552}{11242}$

136. $0.055 per lb.

137. 4.055\frac{4}{7}$ per yd.

138. 0.244\frac{100}{500}$ per lb.

139. - $1.56 per gal.

140. - - - $325

141. 1.507\frac{2}{3}$ per gal.

142. - $6.50 per bbl.

143. - 6.685\frac{2}{35}$ per yd.

144. - $0.36 per gal.

145. - 0.178\frac{48}{84}$ per lb.

146. 0.028\frac{1152}{7884}$ per lb.

147. It will take 1 boarder 8 times as long, that is, 96 days; and it would take 12 boarders $\frac{1}{12}$ part of that time, or 8 days. Ans. 8 days.

148. - - 92 men

149. - - 42 men

150. - - $14\frac{14}{81}$ days

151. - - $11\frac{7}{38}$ days

152. - - 12 days

153. - - $20\frac{4}{13}$ days

154 - $27\frac{15}{22}$ miles

155. - - $33\frac{1}{3}$ bu.

156. Find how many men it would take, if the days were one hour long, and then how many, when they are 11 hours. Ans. 15 men.

157. Find how many months it would take them, if they worked only 1 hour in a day, and then how many, if they worked 10 hours. Ans. $3\frac{1}{11}$ months.

158. A's share $576, B's $288

159. A's share 2994.008\frac{6}{48}$
B's do. 3346.244\frac{18}{48}$
C's do. 2113.417\frac{24}{48}$

160. Both together paid $8, B paid $\frac{4}{8}$, and C $\frac{3}{8}$ of it. They ought to receive in the same proportion.

161. $100. C $\frac{47}{100}$ and D $\frac{53}{100}$
C's share 29\frac{61}{100}$ galls. D's 33\frac{39}{100}$ galls.

162. C's share $\frac{850}{2979}$ of $1353.18 = 386.103\frac{1623}{2979}$
D's do. $\frac{942}{2979}$ of do. = 427.893\frac{2313}{2979}$
E's do. $\frac{1187}{2979}$ of do. = 539.182\frac{1483}{2979}$

163. A's share 1397.653\frac{745}{3835}$
B's do. 5241.199\frac{1835}{3835}$
C's do. 3843.546\frac{1090}{3835}$
D's do. 2620.599\frac{2835}{3835}$
E's do. 297.001\frac{1185}{3835}$

164. F's share $3277.50
G's do. $6397.50
H's do. $5325

165. The first 9.333\frac{6}{18}$
The second $14
The third 18.666\frac{12}{18}$

166. A receives 179.777\frac{724}{5788}$
B " 402.187\frac{644}{5788}$
C " 914.295\frac{540}{5788}$
D " 1476.740\frac{3880}{5788}$

The last nine examples are what is usually called *Simple Fellowship*, for which we deduce the following rule:—Find the stock invested, and make it the denominator, and each man's particular share the numerator of a fraction. These fractions will express each man's proportion of the sum to be received or to be paid.

167. - 18106$\frac{1084}{1665}$ 169. - - - $\frac{169}{1806}$
168. - - 22$\frac{1433}{4871}$ 170. - - - 1$\frac{2841}{5751}$

171. - - - $2\frac{4}{8}\frac{8}{3}\frac{3}{4}$
172. - - - $3\frac{4}{6}\frac{4}{3}\frac{9}{4}$
173. - - $677\frac{1}{3}\frac{3}{5}\frac{9}{6}$
174. - - $677\frac{1}{3}\frac{3}{5}\frac{9}{6}$
175. - - $29\frac{1}{3}\frac{9}{3}\frac{3}{7}$
176. - - $29\frac{1}{2}\frac{8}{3}\frac{3}{7}$
177. - - $133\frac{4}{1}\frac{4}{0}\frac{6}{0}\frac{6}{0}$
178. - - $133\frac{4}{1}\frac{4}{0}\frac{6}{0}\frac{6}{0}$
179. - - $18\frac{1}{1}\frac{3}{3}\frac{1}{0}\frac{9}{7}$
180. - - $18\frac{1}{1}\frac{3}{3}\frac{1}{0}\frac{9}{7}$

XVII.

1. - - - $\frac{1}{9}$ dol.
2. - $\frac{2}{3}$ dol. $3\frac{1}{3}$ dols.
3. - - $\frac{1}{8}$ bbl.
4. - $\frac{3}{17}$ ton. $1\frac{6}{17}$ ton
5. - - $\$10\frac{4}{3}\frac{4}{0}$
6. - - - $\$30\frac{1}{3}$
7. - - $137\frac{3}{5}$ shil.
8. - $7\frac{4}{7}$ bu. 390 bu.
9. - - $126\frac{4}{9}$ bu.
10. - - - $\$107\frac{2}{3}$
11. - - $5\frac{8}{11}$ miles
12. - - $59\frac{3}{5}$ miles
13. - - $5\frac{3}{11}$ bu.
14. - - - $\$7\frac{4}{5}$
15. - - $\$24\frac{8}{1}\frac{4}{0}\frac{4}{0}$

Observe that in all the above examples, the division may be performed by dividing the numerator. In most of those which follow this cannot be done.

16. - $\frac{1}{4}$ of a melon
17. - $\frac{1}{8}$ of the apple
18. - $\frac{3}{5}$ of a bushel
19. - - - - $\frac{3}{4}$
20. - - $\frac{1}{3}$ bushel
21. - - - $\frac{1}{3}$
22. - - - $\frac{1}{10}$ bbl.
23. - - - $\frac{1}{16}$
24. - - $\frac{2}{13}$ bbl.
25. - - $\frac{2}{13}$
26. - - $\frac{2}{17}$ dol.
27. - - - $\frac{2}{37}$
28. - $\frac{2}{43}$ dol.

29. $\frac{1}{6}$ dol. $\frac{2}{6}$ dol. $\frac{7}{6} = 1\frac{1}{6}$ dol.
30. $\frac{1}{6}$. $\frac{2}{6}$. $\frac{7}{6} = 1\frac{1}{6}$.
31. $\frac{3}{33}$ dol. $\frac{14}{33}$ dol. $\frac{47}{33} = 1\frac{14}{33}$ dol.
32. $\frac{3}{33}$. $\frac{14}{33}$. $\frac{47}{33} = 1\frac{14}{33}$
33. $\frac{12}{132}$ of the loss

34. He sold $\frac{12}{275}$. He owned at first $\frac{3}{25}$ of the whole. $\frac{1}{25} = \frac{11}{275}$ and $\frac{3}{25} = \frac{33}{275}$; out of these he sold $\frac{12}{275}$, consequently he had $\frac{21}{275}$ left. Ans. He sold $\frac{12}{275}$, and had $\frac{21}{275}$ left

35. $5\frac{1}{2} = \frac{11}{2}$; $\frac{1}{3}$ of $\frac{11}{2}$ is $\frac{11}{6}$, and $\frac{2}{3}$ of $\frac{11}{2}$ is $\frac{22}{6} = 3\frac{4}{6}$. Ans. $3\frac{4}{6}$ dollars

36. $1\frac{6}{7}$. $3\frac{4}{7}$

37. $1\frac{6}{12}$ bu. $4\frac{3}{12}$ bu.

38. $1\frac{6}{12}$. $4\frac{3}{12}$, or $4\frac{1}{4}$

39. $\$145\frac{46}{88} = \$145.30\overline{68}\frac{46}{88}$

40. $145\frac{24}{72}$

41. $\frac{1099}{504}$ dol. $\frac{1099}{1077}$ dol. $= \$0.102\frac{2394}{1077}$

42. $59\frac{1}{16}$ gals.

43. $50.00

44. $\$15\frac{45}{125} = \$15.296\frac{8}{125}$

45. $\$\frac{16}{128}$. $\$\frac{765}{1125} = \$0.663\frac{168}{1125}$

46. $\$3\frac{428}{600} = 3.648\frac{240}{600}$

47. $\$2\frac{240}{375} = \$2.952\frac{96}{375}$

48. $\$16\frac{8}{50} = \$16.133\frac{20}{50}$

49. $\$4\frac{34}{50} = \$4.74$

50. $\$\frac{132}{175} = \$0.668\frac{100}{175}$

51. $26\frac{1}{15}$s. $= £1.\ 6s.\ 0\frac{12}{15}$d.

52. - - - $\frac{1}{6}$ bbl.

53. - - - $\frac{1}{12}$ yd.

54. - - - $2\frac{3}{4}$ yds.

55. - - $3\frac{8}{15}$ gals.

56. - - - $5\frac{12}{24}$ qts.

57. - - $7\frac{6}{11}$ bbls.

58. $\$25\frac{2}{24} = \$25.083\frac{8}{24}$

59. $5. $\$15\frac{18}{24} = \$15.75$

60. $£15\frac{114}{300} = £15\ 7s.\ 8d.$

In this example, say $£17\ 15s. = £17\frac{15}{20} = £\frac{345}{20}$; then $\frac{13}{15}$ multiplied by $\frac{345}{20} = £15\frac{114}{300}$.——Or first multiply $\frac{13}{15}$ by 17, which makes $£14\frac{11}{15} = £14\ 14s.\ 8d.$ If he can pay $\frac{13}{15}$ of a pound, he can pay $\frac{13}{15}$ of the whole debt, but we have already taken $\frac{13}{15}$ of £17, we have now to take $\frac{13}{15}$ of 15s. which is 13s.; this added to £14 14s. 8d. makes £15 7s. 8d. as before.

61. $\frac{17}{20}$£; consequently he can pay $\frac{17}{20}$ of the whole debt, or $\frac{17}{20}$ of a shilling on a shilling. Ans. £125 10s. $10\frac{8}{20}$d.

62. - - - $\frac{7}{247}$ 74. - - - $4\frac{4}{5}$ times

63. - - - $\frac{4}{1235}$ 75. - - - $5\frac{34}{1235}$

64. - - - $\frac{4}{1235}$ 76. - - $14\frac{334}{3357}$

65. - - - $\frac{2}{1013}$ 77. - - - $\frac{3}{10}$

66. - - - $\frac{63}{11713}$ 78. - - - $\frac{4}{101}$

67. - - - $\frac{63}{11713}$ 79. - - - $\frac{47}{10164}$

68. - - - $1\frac{18}{680}$ 80. - - - $\frac{73}{1013718}$

69. - - - $1\frac{18}{680}$ 81. - - - $\frac{23}{24}$

70. - - - $2\frac{959}{42713}$ 82. - - - $\frac{118}{1213}$

71. - - - $2\frac{104}{1213}$ 83. - - - $\frac{247}{12130}$

72. - - - 3320$\frac{62}{63}$ 84. - - - $\frac{608}{23713}$

73. - - 28851$\frac{248}{360}$

XVIII.

1. $\frac{1}{3}$ $1

Be careful to make the learner perform these examples by dividing the denominator

2. $\frac{1}{3}$. $\frac{1}{3}$. $1

3. $\frac{4}{4} = 1\frac{1}{4}$ bu. $\frac{4}{2} = 2\frac{1}{2}$ bu. 5 bu.

4. $\frac{4}{3} = 1\frac{1}{3}$ bu. 4 bu.

5. $\frac{1}{3}$ of it. $\frac{1}{3}$. $\frac{1}{3}$. $\frac{1}{3}$. The whole

6. $\frac{3}{20}$ bbl. $\frac{3}{5}$ bbl. $\frac{3}{5}$ bbl. $\frac{3}{5}$ bbl. 3 bbl.

7. $8\frac{3}{4} = 9\frac{1}{4}$ bu. 19 bu.

8. $35\frac{3}{4}$ bbls.

9. $\frac{43}{1214}$ ton. $\frac{43}{31} = 1\frac{12}{31}$ ton

10. $8\frac{1}{3}^{9} = 14\frac{1}{3}$ yds. 43 yards

11. $32$$\frac{7}{10}$ = $32.70. $81$$\frac{3}{4}$ = $81.75

12. - - - $\frac{4}{5}$ 14. - - $\frac{1}{9} = 14\frac{1}{9}$

13. - - - $7\frac{1}{3}$ 15. - - - $1\frac{19}{37}$

16. - - - $1\frac{64}{109}$
17. - - - $1\frac{49}{171}$
18. - - - $48\frac{7}{10}$
19. - - - $1217\frac{1}{2}$
20. - - - $411\frac{19}{170}$
21. - - - 7
22. - - - 4
23. - - - 15
24. - - - 11
25. - - - 38
26. - - - 327
27. - - - 1114
28. - - - 14186
29. - - - 12069
30. - - - 14095

XIX.

1. - - 95 yds.
2. - $16\frac{7}{8} = $16.875
3. - - $88\frac{9}{10}$ bu.
4. - - $5\frac{1}{4}$ bu.
5. - - - $2\frac{1}{8}$ yds.
6. - - $18\frac{5}{12}$ lb.
7. - $\frac{1}{6}$ of the apple
8. $24\frac{7}{8} = $24.875
9. - - $22\frac{1}{10}$ cwt.
10. - - $15\frac{5}{8}$ yds.
11. - - $45\frac{3}{31}$ bu.
12. $14\frac{4}{13}$ cwt. = 14 cwt. 1 qr. $1\frac{3}{7}$ lb.
13. $1\frac{9}{35}$ tons = 1 T. 3 cwt. 1 qr. 20 lb.
14. - $\frac{9}{40}$ above water
15. - - - $6\frac{3}{5}$ cwt.
16. - - $23\frac{5}{8}$ gals.
17. - - $41\frac{1}{80}$ cwt.
18. - - $38\frac{12}{115}$ cwt.
19. - $13\frac{47}{77}$ years old
20. - $28\frac{101}{117}$ years old
21. - - $5\frac{37}{88}$ years
22. - - - $\frac{64}{91}$
23. - - - $1\frac{117}{140}$
24. - - - $\frac{86}{231}$
25. - - - $30\frac{5}{12}$
26. - - - $407\frac{3}{7}$
27. - - - $\frac{4}{15}$
28. - - - $\frac{4}{21}$
29. - - - $\frac{8}{11}$
30. - - - $38\frac{29}{35}$
31. - - - $14\frac{43}{47}$
32. - - $528\frac{1473}{1871}$

XX.

1.	- - -	$23		16.	- - -	$12\frac{1}{7}$	
2.	- - -	$5.29		17.	- - -	$27\frac{1}{13}$	
3.	- - -	$7.37		18.	- - -	$49\frac{1}{29}$	
4.	$406\frac{4}{21} =	$406.19\frac{1}{21}$		19.	- -	$601\frac{1}{83}$	
5.	$1\frac{50}{83} =	$1.793\frac{41}{83}$		20.	- - -	$176\frac{31}{112}$	
6.	$28\frac{7}{30} =	$28.233\frac{1}{3}$		21.	- - -	$146\frac{1}{10}$	
7.	-	$44\frac{3}{14}$ lb.		22.	- - -	$129\frac{27}{30}$	
8	- -	$76\frac{52}{63}$ hhds.		23.	- - -	$4\frac{73}{400}$	
9.	- -	$14\frac{1448}{1000}$ bbls.		24.	-	$1\frac{964}{1000} = 1\frac{241}{250}$	
10.	- -	$27\frac{28}{45}$ tons		25.	- - -	$408\frac{3}{28}$	
11.	- -	$4.01\frac{111}{184}$		26.	- -	$86\frac{1813}{4700}$	
12.	- - -	28		27.	$9\frac{246496}{300000} =	$9\frac{123203}{150000}$	
13.	- - -	28		28.	$12\frac{18387}{36000} =	$12\frac{2043}{4000}$	
14.	- - -	24		29.	- -	$1866\frac{63}{450}$	
15.	- - -	42		30.	- -	$31\frac{114091}{500000}$	

XXI.

1. The divisors
of 15 are 3, 5*
" 18 " 2, 3, 6, 9
" 20 " 2, 4, 5, 10
" 21 " 3, 7
" 24 " 2, 3, 4, 6, 8, 12
" 28 " 2, 4, 7, 14
" 42 " 2, 3, 6, 7, 14, 21
" 48 " 2, 3, 4, 6, 8, 12, 16, 24
" 64 " 2, 4, 8, 16, 32
" 72 " 2, 3, 4, 6, 8, 9, 12, 18, 24, 36
" 88 " 2, 4, 8, 11, 22, 44
" 98 " 2, 7, 14, 49

* Every number is divisible by itself.

2. The divisors
of 108 are 2, 3, 4, 6, 9, 12, 18, 27, 36, 54
' 112 ' 2, 4, 7, 8, 14, 16, 28, 56
' 114 ' 2, 3, 6, 19, 38, 57
' 120 ' 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60
' 387 ' 3, 9, 43, 129
' 432 ' 2, 3, 4, 6, 8, 9, 12, 16, 18, 24, 27, 36, 48, 54, 72, 108, 144, 216
' 846 ' 2, 3, 6, 9, 18, 47, 94, 141, 282, 423
' 936 ' 2, 3, 4, 6, 8, 9, 12, 13, 18, 24, 26, 36, 39, 52, 72, 78, 104, 117, 156, 234, 312, 468

3. The divisors
of 8000 are 2, 4, 5, 8, 10, 16, 20, 25, 32, 40, 50, 64, 80, 100, 125, 160, 200, 250, 320, 400, 500, 1000, 1600, 2000, 4000
' 4053 ' 3, 1351
' 1864 ' 2, 4, 8, 233, 466, 932
' 2480 ' 2, 4, 5, 8, 10, 16, 20, 40, 62, 124, 155, 248 310, 496, 620, 1240
' 24,876 ' 2, 3, 4, 6, 9, 12, 18, 36, 691, 1382, 2073, 2764, 4149, 6219, 8292, 12438
' 103,284 ' 2, 3, 4, 6, 9, 12, 18, 36, 2869, 5738, 8607, 11476, 17214, 25821, 34428, 51642
' 7,328,472 ' 2, 3, 4, 6, 8, 12, 24, 305353, 610706, 916059 1221412, 1832118, 2442824, 3664236

4. - - 2, 4, 8 12. - - - 3; 9
5. - - - 2, 4 13. - - - - $\frac{1}{3}$
6. - - - 2, 3, 6 14. - - - $\frac{4}{33}$
7. - - - 7 15. - - - $\frac{4}{7}$
8. - - - 2, 4, 8 16. - - - $\frac{1}{2}$
9. - - - - 3 17. - - - $\frac{1}{30}$
10. - - - 2, 4, 8 18. - - - $\frac{1683}{125011}$
11. - - 2, 3, 6, 18 19. - - - $\frac{3}{101}$

XXII.

1. - - - $\frac{9}{12}$, $\frac{4}{12}$
2. - - - $\frac{27}{36}$, $\frac{8}{36}$
3. - - - $\frac{20}{24}$, $\frac{9}{24}$
4. - - - $\frac{21}{28}$, $\frac{10}{28}$
5. - - - $\frac{15}{36}$, $\frac{14}{36}$
6. - - - 24
7. - - - 56
8. - - - 45
9. - - - 90
10. - - - 210
11. - - - 840
12. - - - 1680
13. - - - 1440
14. - - - 10,500
15. - - - 13,500
16. - - $\frac{21}{324}$, $\frac{40}{324}$
17. - - - $\frac{8}{24}$, $\frac{7}{24}$
18. - - $\frac{75}{270}$, $\frac{80}{270}$, $\frac{81}{270}$
19. $\frac{96}{216}$, $\frac{135}{216}$, $\frac{126}{216}$, $\frac{64}{216}$
20. - $\frac{156}{975}$, $\frac{45}{975}$, $\frac{130}{975}$
21. - $\frac{2106}{46008}$, $\frac{3307}{46008}$
22. - - $\frac{280}{28000}$, $\frac{43}{28000}$
23. - - $\frac{276}{3000}$, $\frac{175}{3000}$
24. - - $\frac{435}{72000}$, $\frac{57}{72000}$

XXIII.

1. - 15 bu.; $7\frac{1}{2}$ bu.
2. 30 peaches; 15 do.
3. 24 labourers; 8 do.
4. - - 24 acres
5. - - $67\frac{1}{7}$ boxes
6. - - $236\frac{1}{4}$ bottles
7. - - $46\frac{1}{3}$ weeks
8. 80 days; 160 persons
9. - - $184\frac{3}{12}$ days
10. - - $871\frac{1}{3}$ axes
11. - - 12 acres
12. - - $19\frac{1}{2}$ acres
13. - - $12\frac{1}{2}$ bu.
14. - - $11\frac{1}{3}$ bbls.
15. - - $4\frac{27}{47}$ acres
16. - - - $1\frac{1}{4}$ tons
17. - - $443\frac{3}{11}$ lb.
18. - - $62\frac{4}{63}$ days
19. $57\frac{4}{7}$ coats
20. $7\frac{9}{11}$ rods = 7 rods, $4\frac{1}{2}$ yds.
21. $15\frac{9}{11}$ rods = 15 rods, $4\frac{1}{2}$ yds.
22. $51\frac{2}{5}\frac{3}{5}$ rods = 51 rods, 3 yds. 2 ft. 6 in.
23. $3\frac{4}{6}\frac{2}{6}\frac{3}{6}$ fur. = 3 fur. 29 rods, 4 yds. 2 ft. 6 in.
24. $8\frac{11}{16}\frac{1}{7}$ = $8\frac{17}{80}$ miles = 8 miles, 2 fur. 18 rods, 5 yds.

25. - - - 3 bu.
26. - 4 dozen; 7 do.
27. - 2 dozen; $6\frac{1}{2}$ do.
28. - $2\frac{1}{3}$ bu. $14\frac{1}{3}$ bu.
29. - - 4 lb. 9 lb.
30. - - - $4\frac{1}{2}$ bu.
31. - - $2\frac{1}{4}$ weeks
32. - - 6 lb. 12 lb.
33. - $6\frac{2}{7}$ bu. $2\frac{2}{15}$ bu.
34. - $5\frac{3}{5}$ bu. $2\frac{4}{5}$ bu.
35. - - $\frac{1}{3}$ bu. $\frac{2}{3}$ bu.
36. - - $\frac{3}{5}$ bu. $\frac{4}{5}$ bu.
37. - 54 eggs
38. - $11\frac{1}{4}$ penny loaves
39. $2\frac{13}{16}$ four-penny loaves
40. $11\frac{1}{4}$ two-penny loaves. $58\frac{1}{8}$ do.
41. $2\frac{4}{5}$ six-penny loaves. 14 do.
42. - - $7\frac{1}{10}$ hats
43. - - $7\frac{1}{10}$ hats
44. - - $9\frac{15}{20}$ bu.
45. - - $9\frac{15}{20}$ bu.
46. - - $25\frac{1}{14}$ coats
47. - - $7\frac{11}{33}$ weeks
48. - - $19\frac{206}{279}$ suits
49. - $19\frac{847}{1387}$ days
50. - - $44\frac{137}{390}$ cows
51 - $3\frac{3}{8}\frac{15}{64}$ chaldrons
52. - - $17\frac{4673}{1853}$ cwt.
53. - $15\frac{20246}{4917}$ casks
54. $30\frac{1761}{1912}\frac{35}{8} = 30\frac{58}{63}\frac{45}{76}$ tons
55. - - $91\frac{4}{5}$ times
56. - - $370\frac{4}{13}$ times
57. - - $13\frac{706}{1883}$ times
58. - $39\frac{21}{47}\frac{98}{10}$ times
59. - - $16\frac{14}{35}$ times
60. - - $139\frac{7}{12}$ times
61. - - $6\frac{61}{117}$ times
62. - - $6\frac{39}{49}\frac{64}{31}$ times
63. - - - $59\frac{14}{41}\frac{47}{12}$
64. - - - $\frac{1}{24}$ bbl.
65. - $\frac{1}{21}$ bbl. $\frac{2}{21}$ do.
66. $\frac{1}{59}$ cwt. $\frac{3}{59}$ do. $\frac{17}{59}$ do.
67. - - $\frac{230}{841}$ ton
68 $\frac{7}{8} = \frac{35}{40}$, and $\frac{2}{5} = \frac{16}{40}$. Ans. $\frac{16}{35}$ of a bushel
69. $2\frac{3}{5} = 1\frac{3}{5} = \frac{91}{35}$, and $3\frac{7}{7} = \frac{24}{7} = 1\frac{11}{35}$

These being reduced to a common denominator have the same relation as their numerators; therefore take the numerators and proceed with them as if they were whole numbers. See Art. XVI. example 158, and the following.

$115 + 91 = 206$. One paid $\frac{115}{206}$ and the other $\frac{91}{206}$ of the whole, and they should have the same proportions. Ans. $\frac{91}{206}$ and $\frac{115}{206}$ respectively.

70. $5\frac{1}{2} = 1\frac{1}{2} = \frac{33}{6}$, and $7\frac{2}{3} = \frac{23}{3} = 4\frac{5}{6}$. $33 + 46 = 79$

The first should pay $\frac{33}{79}$, and the second $\frac{46}{79}$ of 21 dolls. Ans.

$8\frac{4}{11} = 8.$ $8.77\frac{17}{19}$, and $\$12\frac{18}{19} = 12.22\frac{4}{19}$ respectively.

71. - - - $\frac{126}{325}$
72. - - - $\frac{287}{1119}$
73. - - - $\frac{8394}{9853}$
74. - - $\frac{44}{1366991}$
75. - - - $\frac{8}{51}$
76. - - - $\frac{141}{1225}$
77. - - - $\frac{1273}{2878}$
78. - - $\frac{1441107}{2033384}$
79. - - $\frac{74}{1618612}$

XXIV.

1. - - - $1.50
2. - - $26.75
3. - - - $8.625
4. - - - $108
5. - - $192.80
6. - - $99.44
7. - - $127005
8. - - $233334
9. - - $474679.66
10. - - $215665.58
11. - - - $\frac{2}{3}$ doll.
12. - - - $\frac{3}{4}$ doll.
13. - - - $\$1\frac{3}{7}$
14. - - - $\$2\frac{3}{5}$
15. - - - $\$6\frac{12}{25}$
16. - - - $\$98\frac{1}{3}$
17. - - $\$113\frac{9}{17}$
18. - - $\$198760\frac{336}{405}$
19. - - - $0.40
20. - - 8 cents
21. - - $2. $8
22. - $0.30. $2.40
23. - $0.19. $1.52
24. - - $2. $10
25. - $0.60. $4.20
26. - - . $20
27. - - 40 miles
28. - - - $6.79
29. 24 years is $\frac{3}{8}$ of his age.
Ans. 64 years
30. - - $91.26
31. - $7\frac{1}{2} = $7.50
32. - $5\frac{2}{3}$ cents. $0.45\frac{1}{3}$
33. - - $2\frac{4}{5}$ cents

34. $\$1\frac{1}{4} = 1.25.$ $\$16\frac{1}{4} = 16.25$
35. $6\frac{3}{4}$ miles.
36. $\$74666\frac{2}{3} = 74666.66\frac{2}{3}$
37. $18750.
38. $\$305075\frac{14}{21} = 305075.89\frac{1}{3}$
39. $\$6\frac{3}{5} = 6.60$

40. $2\frac{3}{4} = \frac{1}{8}$. $\frac{1}{13}$ of 13s. is 1s. and $5 \times 1 = 5$. Ans. 5s.
41. $8\frac{9}{13} = \frac{113}{13}$; $\frac{1}{113}$ of 15 is $\frac{15}{113}$, and 13 times this is $\frac{195}{113} = \$1\frac{82}{113}$. $\$86\frac{32}{113} = 86.28\frac{36}{113}$
42. Find the price of 1 cwt., as in the last, and let it stand in the form of an improper fraction; then reduce $17\frac{3}{4}$ to an improper fraction and multiply by it. Ans. $\$198\frac{143}{113} = \$198.19\frac{13}{113}$
43. $\$\frac{3}{37}$. $\$\frac{11}{37}$
44. $\$\frac{3}{13}$. $\$\frac{8}{13}$
45. $\$\frac{40}{63}$
46. $1\frac{69}{136}$ month. $7\frac{23}{136}$ do.
47. $\$10\frac{4}{13}$. $\$178\frac{13}{68} = 178.38\frac{1}{2}$
48. $\$145\frac{7}{20} = 145.35$
49. $\$4\frac{17}{25} = 4.07\frac{4}{5}$
50. $\$5\frac{107}{325} = 5.30\frac{82}{325}$
51. $1\frac{437}{1379}$ bbls. $\frac{1379}{1816}$ yds.
52. $£\frac{119}{130} = 17s.\ 2\frac{3}{11}d.$
53. $£93\frac{7}{10} = £93\ 9s.\ 7\frac{5}{7}d.$
54. He sold $\frac{6}{25}$ of the whole. The vessel was worth $49000
55. $£2653\frac{3}{49} = £2653\ 1s.\ 2\frac{34}{49}d.$
56. $9\frac{173}{253}$ days
57. $7\frac{7}{24}$ days
58. $52\frac{104}{243}$ acres
59. There is $\frac{4}{55}$ of it in the mud; and in the mud and water both there is $\frac{14}{55}$ of it; therefore $7\frac{3}{4}$ is $\frac{3}{55}$ of the whole pole. Ans. $12\frac{7}{44}$ ft. $= 12$ ft. $3\frac{1}{2}$ inches.

60.	- - -	$160	67.	- - -	$24\frac{3}{13}$
61.	- - -	$120	68.	- - -	$52\frac{16}{25}$
62.	- -	72	69.	- -	$5162\frac{10}{13}$
63.	- - -	864	70.	- - -	$3681\frac{37}{76}$
64.	- - -	$95\frac{1}{2}$	71.	- - -	$254\frac{33}{128}$
65.	- - -	$173\frac{1}{13}$	72.	- -	$22162\frac{91}{387}$
66.	- - -	$1585\frac{17}{43}$	73		$4134\frac{79}{645}$

74. - - - $4\frac{1}{3}$
75. - - - $\frac{14}{27}$
76. - - - $1\frac{11}{21}$
77. - - - $\frac{14}{36}$
78. - - - $1\frac{8}{125}$
79. - - - $1\frac{471}{288}$
80. - - $2\frac{154}{1218} = 2\frac{11}{87}$
81. - $\frac{1474}{3468} = \frac{737}{1734}$
82. - $1\frac{189}{6579} = 1\frac{21}{731}$
83. - - $55\frac{814}{2025}$
84. - $7\frac{112}{216} = 7\frac{14}{27}$
85. - - $173\frac{158}{409}$
86. - - $216\frac{376}{387}$
87. - $241\frac{58}{108} = 241\frac{17}{27}$
88. $137\frac{1658}{4617} = 137\frac{886}{1539}$
89. $2\frac{3}{11}\frac{164}{325} = 2\frac{7388}{17175}$
90. $2\frac{3}{11}\frac{164}{325} = 2\frac{7388}{17175}$
91. - - $33\frac{2443}{4375}$
92. - - $33\frac{2443}{4375}$
93. - $19\frac{93}{120} = 19\frac{31}{40}$
94. - - - $19\frac{31}{40}$
95. - - $104\frac{116}{143}$
96. - - $104\frac{116}{143}$
97. - - - $67\frac{1}{3}$
98. - - $67\frac{1}{3}$ times
99. - - - $67\frac{1}{3}$
100. - - - $4\frac{3}{75}$
101. - - $4\frac{3}{75}$ times
102. - - - $4\frac{3}{75}$
103. - - - $5\frac{69}{80}$
104. - - $5\frac{69}{80}$ times
105. - - - $5\frac{69}{80}$

106. Cost \$210, gained \$42
107. First cost \$216. Gain \$27
108. Cost $\$2884\frac{1}{2} = 2884.50$. Gain \$961.50
109. $\$1.50\frac{301}{504}$ per gall.
110. Cost $266\frac{12}{13} = 266.92\frac{4}{13}$. Gain $\$80.07\frac{9}{13}$
111. Cost $\$120\frac{3}{11} = 120.27\frac{3}{11}$. Gain $\$26.72\frac{8}{11}$
112. Gain $\$2064\frac{1}{2\,3} = 2064.04\frac{6}{11}$
113. Cost $\$249\frac{1}{3} = 249.33\frac{1}{3}$. Loss $\$62.33\frac{1}{3}$
114. Cost $\$294\frac{6}{7} = 294.85\frac{5}{7}$. Loss $\$36.85\frac{5}{7}$
115. Loss $\$344\frac{8}{11} = 344.72\frac{8}{11}$
116. Whole loss $\$16.80\frac{3}{4}$. Loss per gall. $\$0,08\frac{24}{25}$
117. Loss per yd. $\$0.87\frac{101}{403}$
118. Cost $\$150\frac{1}{2} = 150.50$
119. Cost $\$248\frac{8}{11} = 248.18\frac{8}{11}$
120. He gained $\frac{13}{100}$ of the cost, consequently he sold them for $\frac{113}{100}$ of the cost. Divide by 113, and the quotient will be $\frac{1}{100}$ of the cost. Or, which is generally better, multiply first by 100, and divide by 113, and you will

obtain the cost. Cost $119\frac{3}{113} = 119.46\frac{1}{113}$. Gained $15.53\frac{11}{113}$

121. Gained $1526\frac{17}{33} = \$1526.51\frac{17}{33}$
122. Cost $1117\frac{1}{33} = 1117.04\frac{6}{11}$. Loss $134.04\frac{6}{11}$
123. Cost $331.16. Loss $82.79
124. Cost $669\frac{3}{13} = 669.23\frac{1}{13}$. Sold them for $756.23\frac{1}{13}$
125. Cost $215
126. Cost $595\frac{6}{23} = 595.65\frac{6}{23}$. Sold them for $458.65\frac{6}{23}$
127. 40d. = 3s. 4d. per lb.
128. $0.51\frac{1}{2}$ per gall.

Note. D gains 9 cents on a gallon, which is $\frac{9}{23}$ of the cost; hence 20 cents is $\frac{9}{23}$ of the cost of the brandy.

129. Age 66 years

Note. $\frac{1}{2}$ and $\frac{1}{3}$ are $\frac{5}{6}$, which added to his age makes $\frac{11}{6}$. Hence 121 is $\frac{11}{6}$ of his age.

130. $216\frac{2}{3} = 216.66\frac{2}{3}$
131. $950
132. $223.58\frac{6}{23}$
133. $441.66\frac{2}{3}$
134. $1077.77\frac{7}{9}$
135. $358.18\frac{3}{11}$
136. £171 $\frac{3}{107}$ = £171 0s. $6\frac{78}{107}$d.
137. $114\frac{1}{9} = \$114.16\frac{2}{3}$
138. $270\frac{40}{23} = 270.75\frac{6}{23}$
139. $822\frac{34}{103} = 822.33\frac{1}{103}$
140. $96\frac{2}{13} = 96.15\frac{6}{13}$
141. $0.33\frac{4}{23}$
142. $23.22\frac{18}{31}$

Miscellaneous Examples, page 79.

1. 2 sq. in.; 3 do.; 4 do.; 5 do. 7 do.

2. 8 sq. in.; 16 do.; 24 do. 32 do.; 40 do.; 64 do.
3. 2 sq. ft.; 3 do.; 5 do.; 9 do.; 15. do.
4. 9 sq. ft.; 18 do.; 27 do.; 45 do.; 63 do.; 81 do.
5. 13 sq. in.; 26 do.; 39 do.; 104 do.
6. 16 sq. ft.; 32 do.; 48 do.; 80 do.; 128 do.; 208 do
7. Multiply the length by the breadth
8. 234 sq. ft.
9. 13,871 sq. ft.
10. 196 sq. rods
11. 160 sq. rods
12. $9\frac{7}{17}$ rods wide
13. 144 sq. in.
14. 18 in. in length
15. 9 sq. ft.
16. $30\frac{1}{4}$ sq. yds.
17. 1296 sq. in.
18. 40 sq. rods
19. 4 roods
20. See Arithmetic, page 239
21. 39,204 sq. in.
22. 4840 sq. yds.
23. 6,272,640 sq. in.
24. 12 sq. ft.
25. 1 acre, 126 rods, or $1\frac{3}{10}$ acre
26. $32\frac{55}{63}\frac{93}{71}\frac{96}{640}$ acres = 32 acres, 14 rods, 8 yds. 1 ft. 28 in.
27. 102,400 sq. rods
28. 640 acres
29. 126,720,000,000 acres
30. 1980 sq. in.; 13 sq. ft. 108 in., or $13\frac{1}{4}$ sq. ft.
31. $110\frac{1}{10}\frac{1}{0}$ acres
32. $49\frac{41}{243}$ yds.
33. 2 cub. in.; 3 do.; &c. 8 do.
34. 12 cub. in.; 24 do.; &c. 96 do.

35. 4 cub. in.; 8 do.
36. 12 cub. in; 24 do.; 36 do.
37. 80 cub. in.; 160 do.; 240 do; 400 do; 560 do.
38. 234 cub. in.; 1170 do.; 2574 do.
39. Multiply together the length, breadth, and thickness
40. 1728 cub. in.
41. 128 cub. ft.
42. See Arithmetic, page 239
43. 221,184 cub. in.
44. 86,400 cub. in.
45. $271\frac{143}{864}$ cub. ft.
46. $23\frac{19}{36}$ cub. ft.

Note. When one dimension is given in feet and the other two in inches, multiply the numbers together without reducing the feet to inches, and divide the product by 144, and the quotient will be the answer in cubic feet. If two dimensions are in feet and one in inches, multiply them together as they are, and divide the product by 12 to reduce it to feet. In the above example, if 28 feet be reduced to inches, the operation will stand thus

$$\frac{11 \times 11 \times 28 \times 12}{1728} = \frac{11 \times 11 \times 28 \times 12}{144 \times 12}$$

rejecting the 12 from the numerator and denominator, it becomes

$$\frac{11 \times 11 \times 28}{144}$$

47. $57\frac{7}{24}$ ft. = 1 ton $7\frac{7}{24}$ ft.
48. 8 ft.
49. 345 cub. ft. $21\frac{9}{16}$ feet of wood. 2 cords $5\frac{9}{16}$ feet

XXV.

Decimal Fractions.

1.	27.6	28.	1.043
2.	14.07	29.	17.0573
3.	123.008	30.	193.0047
4.	108.5	31.	87.00106
5.	73.09	32.	95.406
6.	4.006	33.	98.006004
7.	16.001	34.	.30507
8.	.6	35.	.0807
9.	.05	36.	$42\frac{5}{10} = 42\frac{1}{2}$
10.	.007	37.	$84\frac{25}{100} = 84\frac{1}{4}$
11.	.0002	38.	$9\frac{8}{10} = 9\frac{4}{5}$
12.	3.42	39.	$137\frac{4}{25}$
13.	$\frac{40}{100}$ or .40	40.	$25\frac{1}{8}$
14.	$\frac{42}{100}$ or .42	41.	$18\frac{4}{8}$
15.	$\frac{300}{1000}$ or .300	42.	$11\frac{3331}{10000}$
16.	$\frac{80}{1000}$ or .080	43.	$163\frac{5432}{6210}$
17.	$\frac{385}{1000}$ or .385	44.	$72\frac{13}{2000}$
18.	7.385	45.	$4\frac{1}{4000}$
19.	$\frac{2000}{10000}$ or .2000	46.	$13\frac{300329}{2000000}$
20.	$\frac{500}{10000}$ or .0500	47.	$\frac{3}{4}$
21.	$\frac{60}{10000}$ or .0060	48.	$\frac{5}{16}$
22.	$\frac{2567}{10000}$ or .2567	49.	$\frac{3}{40}$
23.	.2567	50.	$\frac{4}{31250}$
24.	13.23	51.	$\frac{3}{200000}$
25.	21.182	52.	$\frac{63}{2000000}$
26.	12.5736	53.	$\frac{3001137}{20000000}$
27.	142.38746		

XXVI.

1. $22.295
2. $13.409 = 13\frac{409}{1000}$ bu.
3. $75.975 = 75\frac{39}{40}$ cwt.
4. $759.77625 = 759\frac{621}{800}$ bu.
5. £16.365 = £16\frac{73}{200}$
6. $8899.3799 = 8899\frac{3799}{10000}$
7. $24.015 = 24\frac{3}{200}$ yds.
8. $65.625
9. £155.245 = £155\frac{49}{200}$
10. £2.428 = 2\frac{107}{250}$ = £2 8s. 6\frac{8}{25}$d.
11. £95.775 = £95\frac{31}{40}$
12. $333.75
13. 468.8312 = 468\frac{1039}{1250}$ lb.
14. 9.1372 = 9\frac{3413}{2500}$ tons

XXVII.

Multiplication of Decimals.

1.	- -	$87.15	12.	-	-	-	.0342
2.	- -	$63.00	13.	-	-	-	$3
3.	- -	61.18 bu.	14.	-	-	-	$63
4.	- -	194.8 cwt.	15.	-	-	-	$36
5.	74.375 = 74\frac{3}{8}$	cwt.	16.	-	-	-	$58
6.	- -	325.5 cwt.	17.	-	-	-	$190
7.	- -	1619.56	18.	-	-		$351.50
8.	- -	2338.911	19.	-	-	-	$456
9.	- -	808.868	20.	-	-		$4283.40
10.	- -	38.7555	21.	-	-		$199.50
11.	- -	12.528	22.	-	-		$112.50

23.	- - -	64	45.	- -	$197.10
24.	- - -	214	46.	- -	$474.00625
25.	- - -	107	47.	- -	$1938.90
26.	- -	713.769	48.	- -	$0.018
27.	-	713.769	49.	- -	1.9665 cwt.
28.	- -	15071	50.	- -	- 10.35
29.	- - -	243.6	51.	- -	18.802
30.	- - -	6058	52.	- -	- 34.6
31.	- -	41711.9491	53.	- -	290.1186
32.	- -	67418	54.	- -	25.2885
33.	- - -	3393	55.	- -	13.167392
34.	- -	627120	56.	- -	7.003215
35.	- -	49552.25	57.	- -	3.410904106
36.	- -	667683.84	58.	- -	.002012
37.	- - -	$0.06	59.	- -	.00030021
38.	- - -	.06	60.	- -	- .06
39.	- - -	.06	61.	- -	- .008
40.	- - -	$0.36	62.	- -	.00003
41.	- - -	$0.70	63.	- -	- .00001
42.	- - -	$1.62	64.	- -	.000011021
43.	- -	$2.021	65.	-	1.344200769712
44.	- -	$39.738			

Miscellaneous Examples, page 87.

1.	- - -	$69	6.	- -	$77.832—
2.	- -	$946.875	7.	- -	$360.934+
3.	- -	$62.3656+	8.	- -	$401.899+
4.	- -	$57.145+	9.	-	$655.717+
5.	- -	$39.918+	10.	- -	$481.384+
11.	3.696+cwt.	17.351+cwt.	4.1445+cwt.		
12.	43.2777+hhds.	0.24+hhds.	7.01389—hhds.		
13.	$3.816+				

In the following examples, the nearest decimal will be given without the mark to show whether it is too large or too small.

14.	- -	$2.137	29.	- -	.7879 rod
15.	- -	$2.391	30.	- -	.1667 ft.
16.	- -	$17.973	31.	- -	.5833 ft.
17.	- -	$129.594	32.	- -	.4444 rod
18.	- -	$4.414	33.	- -	.02434 mile
19.	- -	.875 yd.	34.	- -	£0.675
20.	- -	.4375 yd.	35.	- -	.4375s.
21.	- -	.8125 lb.	36.	- -	£0.574
22.	- -	.6071 qr.	37.	- -	See book.
23.	- -	.475 qr.	38.	-	£7 14s. 11½d.
24.	- -	.25 day	39.	-	- £40 3s. 4d.
25.	- -	.684 day	40.	-	- £28 4s. 8¼d.
26.	- -	.5709 day	41.	-	£120 10s. 9½d.
27.	- -	.7833 h.	42.	-	- See book.
28.	- -	.6464 h.			

43. $5\frac{3}{4} = 5.4$. 4 cwt. 3 qrs. 7 lbs. = 4.8125 cwt.
These multiplied together produce 25.9875 cwt.
Reducing the fraction to quarters, pounds, &c.

.9875
4

qrs. 3.9500
28

760
190

lbs. 26.60
16

oz. 9.6

Ans. 25 cwt. 3 qrs. 26 lb 9⅗ oz.

44. 25.905 cwt. = 25 cwt. 3 qrs. 17 lb. 3$\frac{1}{2}$ oz.
45. 7s. 8d. 3 qrs.
46. 19s. 8d.
47. 2 qrs. 9 lb. 4 oz.
48. 25 lb. 12 oz.
49. 2 qrs. 26 lb. 7 oz.
50. 9d.
51. 10 lb. 12 oz.
52. 93.156 lb. = 93 lb. 2 oz.
53. 1124.16d.
54. 8 h. 18 min. 14 sec.
55. 35 min. 15 sec.
56. 3.5 ft.; 4.25 ft.; 7.75 ft.; 3.66 + ft.; 5.58 + ft.; 9.833 + ft.
57. 4 in. 1.5 barley corn.
58. 67.4 sq. in.
59. 1458 in.
60. 11.43 sq. ft.
61. 281.94 sq. ft.
62. 29.72 sq. ft.
63. 30.4 ft.
64. 204 cub. ft.
65. See book.
66. $95.078
67. $89.171
68. Gained $58.122. Whole $445.602.

69.	-		$1331.25	75.	-	-	$46.744
70.	-	-	$25.966	76.	-	-	$169.812
71.	-	-	$118.343	77.	-	-	$0.60
72.	-	-	$384.12	78.	-	-	$3.719
73.	-	-	$95.452	79.	-		$2.595
74.	-	-	$2124.725	80.	-	-	$12.85

81. For 2 years, 12 per cent. = .12.
For 3 years, 18 do. = .18.
For 4 years, 24 do. = .24.

82. For 6 months, 3 per cent. = .03
For 2 months, 1 do. = .01
For 4 months, 2 do. = .02
For 1 month, $\frac{1}{2}$ do. = .005
For 3 months, $1\frac{1}{2}$ do. = .015
For 5 months, $2\frac{1}{2}$ do. = .025
For 7 months, $3\frac{1}{2}$ do. = .035
For 8 months, 4 do. = .04
For 9 months, $4\frac{1}{2}$ do. = .045
For 10 months, 5 do. = .05
For 11 months, $5\frac{1}{2}$ do. = .055

83. For 13 months, $6\frac{1}{2}$ per cent. = .065
For 14 months, 7 do. = .07
For 17 months, $8\frac{1}{2}$ do. = .085

84. For 6 days, $\frac{1}{10}$ per cent. = .001
For 12 days, $\frac{2}{10}$ do. = .002
For 18 days, $\frac{3}{10}$ do. = .003
For 24 days, $\frac{4}{10}$ do. = .004
For 36 days, $\frac{6}{10}$ do. = .006
For 42 days, $\frac{7}{10}$ do. = .007
For 48 days, $\frac{8}{10}$ do. = .008
For 54 days, $\frac{9}{10}$ do. = .009

85.	$0.472	91.		$0.703
86.	$0.544	92.		$0.426
87.	$4.439	93		$0.197
88.	$3.515	94.		$0.832
89.	$17.026	95.		$1.53
90.	$4.273	96.		$20.966

97. 6 months is 3 per cent. = .03. Then 1 month and 15 days are 45 days, which, divided by 6, gives .0075. The rate is .0375. Ans. $4.33.

98. $30.37

99. $13.93

100. $409.43

101. $1085.073
102. Interest $62.91 Due $596.91
103. $15.70
104. See book
105. 15s. = £0.75; 3d. 2 qrs. = 14 farthings; adding 1 because the number is greater than 12, it may be called £0.015. The whole is £13.765. The rate for 1 year and 6 months is .09

13.765
.09

Ans. £1.23885

The .2 = 4s. The rest of the fraction is nearly .039. Taking 2 from this, because the number is greater than 36, we have 37 farthings, which are 9d. 1 qr. Ans. £1 4s. 9¼d.

106. 4s. 4½d.
107. £34 7s. 11d.
108. £4 18s. 4d.
109. £1 5s. 4¼d.
110. 2s. 6d. 2qr.
111. 2d.
112. £7 3s. 7¾d.
113. £42 11s. 3½d.

XXVIII.

Division of Decimals.

1.	-	-	$3.75	4.	-	-	1.5 bbl.
2.	-	-	$5.781	5.	-	-	1.406 bu.
3.	-	-	$36.715	6.	-	-	4.899 miles.

7.	- -	£1 8s. 3¼d.	41.	- -	$4.148
8.	- -	£83 11s. 1d.	42.	- -	9s. 1½d.
9.	- -	6.172	43.	- -	$2.50
10.	- -	34.326	44.	- -	$22.857
11.	- -	.352	45.	37.825s. =	£1 17s.10d.
12.	- -	2.871	46.	379.562s. =	£18 19s. 6¾d
13.	- -	3.4617	47.	- -	13.846 times
14.	- -	28.903	48.	- -	12 times
15.	- -	1.4038	49.	- -	37.895
16.	- -	4618	50.	- -	297.771
17.	- -	.09226	51.	- -	2.567
18.	- -	.02634	52.	- -	10.204
19.	- -	.00413	53.	- -	3.627
20.	- -	.0258	54.	- -	10
21.	- -	.03077	55.	- -	100
22.	- -	.00128	56.	- -	61.538
23.	- -	.00007	57.	- -	44.156
24.	- -	.0005765	58.	- -	687.1345
25.	- -	.0001006	59.	- -	530000
26.	- -	27 galls.	60.	- -	254000
27.	- -	70.6 bu.	61.	- -	10
28.	-	Omitted in Book	62.	- -	100
29.	- -	18.18 lb.	63.	- -	61.538
30.	- -	166.7 lemons	64.	- -	44.156
31.	- -	21.7 coats	65.	- -	687.1345
32.	- -	17.7 acres	66.	- -	530000
33.	- -	10.56 acres	67.	- -	254000
34.	- -	15.41 hours	68.	- -	19142.857
35.	- -	43.333 days	69.	- -	19142.857
36.	- -	38.87 days	70.	- -	35.862
37.	- -	43.69 galls.	71.	- -	2.802
38.	- -	$2.80	72.	- -	16.6113
39.	- -	$6.667	73.	- -	.8333
40.	- -	$8.364	74.	- -	.8333

75. - - .517
76. - - .517
77. .46
78. - .46
79. - - .1905
80. - - .1905
81 - - 20
82. - 156.627
83. - - 6320.896
84. - - 124.031
85. - - 408.163
86. - - 177.211
87. - - 15700000
88. - - 20.473 galls.
89. - - 2.43 galls.
90. - - 5.324 galls.
91. - - 14.942 bbls.
92. - - $3.765
93. £0.781 = 15s. 7½d.
94. - - $6.355
95. - - $96.72
96. - - 3.105 times
97. - - 322.718
98. - - 17.549
99. - - 22.321
100. - - 22.321
101. - - 100
102. - - 100
103. - - 5
104. - - 5
105. - - 1
106. - - 1
107. - - 13.27
108. - - 3.598

109. - - 9.821 lb.
110. - - $6.30
111. £6.484 = £6 9s. 8¼d.
112. - - 17.918 bu.
113. - - 6s. 8¾d.
114. - - £1 2s. 4d.
115. - - £39 1s. 2½d.
116. - - 6.583
116. - - 42.173
117. - - 352.46
118. - - 754.26
119. - - 1.28255
120. - - 783.57
121. - - 14.6934
122. - - .9957
123. - - 28.308
124. - - 28.308
125. - - 99.314
126. - - 99.314
127. - - .10837
128. - - .003002
129. - - $\frac{1757}{1433}$
130. - - $\frac{3746}{3873}$
131. - $\frac{6374}{9306} = \frac{2125}{1758}$
132. - $\frac{3454}{5754} = \frac{1735}{1371}$
133. - - $\frac{16487}{23760}$
134. $\frac{1124600}{2147764} = \frac{283685}{539691}$
135. - $\frac{7384}{3700} = \frac{1846}{925}$
136. - - $\frac{7}{300}$
137. - - $\frac{647387}{42000}$
138. - - $\frac{3000}{67}$
139. - - $\frac{300}{1}$
140. - - $\frac{37}{78}$
141. - - $\frac{1376}{1750} = \frac{688}{875}$

142. - - $\frac{703857}{4395360}$ 143. - - $\frac{1406406}{8944785}$

Miscellaneous Examples, page 101.

1. $70.269
2. $122.784
3. $8.192
4. $206.328
5. 1.417 cwt.
6. £43 11s. $1\frac{1}{4}$d.
7. 38.727 oz. $= 38\frac{8}{11}$ oz.
8. 10.383 ft.
9. 5.1 yds.
10. .00517 of a guinea = 13d.*
11. 43.976 days
12. 126.727 days
13. 272.875 sq. ft.; 8 sq. ft.; 34.11 yds.
14. 39.48 yds.
15. 3117.56 ft. $10.911
16. 860.2 ft.
17. 10.72556 bunches
18. 7.667 acres
19. $225.075
20. 3 cords
21. 2 ft. 8 in. = 3.666 + ft.

$$\begin{array}{r} 3.666+ \\ \hline 4 \\ \hline 14.664+ \end{array} \quad (2$$

Ans. 7.33 ft. of wood.

* In this example, instead of .075 of a guinea, read .75 of a guinea.

In this I multiply the height and breadth together, and then, instead of multiplying by 8 and dividing by 16, I divide at first by 2.

22. 4.3 ft. of wood
23. 9.23 ft. of wood.
24. 1.39 cord, or 1 cord, 3.1 ft.
25. 4.45 ft. = 4 ft. 5.4 in.
26. 70848 bricks
27. £141 12s. 11¼d.
28. $34.59
29. $33.734
30. £95 1s. 0¼d.
31. 6145.88(153647
    6145.88 ———
    ——— $0.04 on a dollar
    .. Ans. $939.027
32. The tax on $1 is $0.0339. Ans. $87.23
33. .2855=28$\frac{55}{100}$ per cent.
34. He gained $\frac{5}{20}$ of the first cost, which is .25 or 25 per cent.
35. .044 = 4$\frac{4}{10}$ per cent.
36. .11 = 11 per cent.
37. 1s. 8d. = 20d. 2s. 3d. = 27d. He gained 7d. which is $\frac{7}{20}$ of the first cost. $\frac{7}{20}$ = .35 or 35 per cent.
38. .137 = 13$\frac{7}{10}$ per cent.
39. 15$\frac{3}{10}$ per cent.
40. 18$\frac{6}{10}$ per cent.
41. He can pay $\frac{134}{191}\frac{78}{273}\frac{19}{43}$ of the whole debt. This reduced to a decimal is .704 — Ans. 70$\frac{4}{10}$ per cent. nearly
42. The whole discount was $11.40, which is $\frac{114}{570}$ = .2 Ans. 20 per cent.
43. The whole interest was $5.22, which is $\frac{522}{6700}$ of the

principal. This reduced to a decimal is .06. Ans. 6 per cent.

44. He paid $12.81 for 2 years, which is $6.405 for 1 year. $\frac{6}{180}\frac{405}{000} = .035$. Ans. $3\frac{1}{2}$ per cent.

45. Find how much he paid for 1 year, and then find the rate as above. Ans. $6\frac{1}{2}$ per cent. nearly

46. $.0452 = 4\frac{52}{100}$ per cent.

47. Since 4s. 6d. is equal to 9 sixpences, and £1 is equal to 40 sixpences

40(9

Ans. $4.444 +

48. Reduce the £35 to sixpences and divide by 9; or multiply $4.444 + by 35. If there are shillings and pence, they must be reduced to decimals. Ans. $155.555

49. £27 14s. 8d. = £27.733 or £27.733

4.444	40
110932	11.09320(9
110932	
110932	$123.258
110932	
$123.245452	

The latter method is shorter and more exact.

50. $834.964 +

51. Multiply by 9 to reduce it to English sixpences, and then divide by 40, the number of sixpences in £1; or divide $19.42 by $4.444. Ans. £4.369 = £4 7s. $4\frac{1}{2}$d.

52. £35.325 = £35 6s. 6d.

53. £536 11s. 3d.

54. Cost $680.30 Sold $761.94

55.	-	-	$5.386 +	65.	-	-	$0.00291
56.	-	-	$5.80	66.	-	-	$0.00068
57.	-	-	$12.848	67.	-	-	$0.002177 +
58.	-	-	$6.517	68.	-	-	$0.06372
59.	-	-	$16.387	69.	-	-	7s. 6¾d.
60.	-	-	£11 9s. 0½d.	70.	-	-	3½d.
61.	-	-	£19 5s. 2d	71.	-	-	6s. 6¾d.
62.	-	-	£2 15s. 1d.	72.	-	-	5s. 10½d.
63.	-	-	£21 18s. 1¾d.	73.	-	-	$564.08
64.	-	-	$127.133 +	74.	-	-	$1132.90

In examples like the two last, some compute the interest on the whole sum to the time of the first payment and add it to the principal, and then deduct the payment; then they compute the interest on the remainder to the time of the second payment, and add it to the principal, and deduct the payment again; and so on. This is not a just method, if simple interest only is allowed, for if the payments were made annually, it would be compound interest; and if they were made oftener, it would be more than compound interest.

Answers to the examples in Circulating Decimals, page 209 *and* 210.

.555 &c. $= \frac{5}{9}$
.666 &c. $= \frac{6}{9} = \frac{2}{3}$
.777 &c. $= \frac{7}{9}$
.888 &c. $= \frac{8}{9}$
.999 &c. $= \frac{9}{9} = 1$
.533 &c. $= \frac{5}{10} + \frac{3}{90} = \frac{48}{90} = 1$
.466 &c. $= \frac{4}{10} + \frac{6}{90} = \frac{14}{30} =$
.388 &c. $= \frac{7}{18}$
.3744 &c. $= \frac{37}{100} + \frac{4}{900} = \frac{33}{90}$.

$.46355$ &c. $= \frac{463}{1000} + \frac{5}{10000} = \frac{1043}{2250}$

$.\dot{2}\dot{4} = \frac{24}{99} = \frac{8}{33}$

$.\dot{4}\dot{2} = \frac{42}{99} = \frac{14}{33}$

$.5\dot{3}7 = \frac{5}{10} + \frac{37}{990} = \frac{244}{495}$

$.474\dot{5} = \frac{47}{100} + \frac{45}{9900} = \frac{4698}{9900} = \frac{783}{1650}$

$.\dot{8}37\dot{4} = \frac{8374}{9999}$

$.4764\dot{7} = \frac{47}{100} + \frac{647}{99900} = \frac{476}{999}$

Miscellaneous Examples, page 211.

1.	-	-	1s. 4d.	5.	-	-	3s. 2d.
2.	-	-	4s. 3d.	6.	-	-	£1 12s.
3.	-	-	11d.	7.	-	-	15s. 2d.
4.	-	-	3s. 2d.	8.	-	-	17s. 10d.

9. 4s. 5d.
10. £1 6s. 1d.
11. £2 9s. $9\frac{1}{7}$d.
12. £2 12s. $3\frac{5}{8}$d.
13. 2 cwt. 1 qr. 21 lb.
14. £2 13s. $8\frac{1}{3}$d.
15. 2 cwt. 3 qrs. $24\frac{1}{2}$ lb.
16. 2 cwt. 1 qr. $9\frac{4}{7}$ lb.
17. 46 galls. $1\frac{1}{2}$ qt.
18. 1 coat 1 yd. 3 qrs. $1\frac{3}{7}$nl.
    13 coats 23 yds. 3qrs. $2\frac{4}{7}$ nls.
19. £65 3s. 4d.
20. £17 1s. $1\frac{1}{8}$d.
21. In this example, I first multiply by $54 = 6 \times 9$, and then subtract $\frac{1}{3}$ of £56 9s. 7d. from the product. I then divide the whole by $18 = 3 \times 6$

£	s.	d.	
56	13	8	
		9	
510	3	0	
		6	
3060	18	0	
—11	6	$8\frac{4}{5}$	$= \frac{1}{5}$ of £56, &c.
3049	11	$3\frac{1}{5}$	(6
508	5	$2\frac{4}{30}$	(3

£169 8s. $4\frac{7}{30}$d. Ans.

22. £1650 18s. 5d.
23. £5 8s. $0\frac{8}{21}$d.
24. £3 0s. $2\frac{2}{15}$d.
25. £39 11s. $2\frac{2}{4}\frac{2}{3}\frac{2}{3}$d.
26. $103\frac{1}{2}$ ft.
27. 17h. 12 min.
28. $11\frac{1}{3}$ days.
29. They meet on the next day after their departure at 9h. $50\frac{1}{2}\frac{1}{3}$ min. morn. The distance from Boston $127\frac{3}{6}\frac{7}{6}$ miles, and from New York $122\frac{3}{6}\frac{3}{6}$ miles.
30. A $17\frac{1}{1}\frac{1}{2}$. B $14\frac{1}{1}\frac{1}{2}$
31. $11\frac{1}{2}$ oz.
32. 390 men
33. 10 days
34. $15\frac{1}{1}\frac{3}{5}$ oz.
35. $4\frac{1}{2}$ yds.
36. $9\frac{1}{1}\frac{1}{4}$ months
37. $4166\frac{2}{3}$ yds. of shalloon
38. $202\frac{4}{1}\frac{1}{2}$ quarters.

39. 20 men

40. If 7 men can build 36 rods in 3 days, they can build 12 rods in 1 day, and 168 rods in 14 days. If 7 men can build 168 rods, 20 men can build 480 rods in the same time. Ans. 480 rods.

41. $19\frac{4}{9}$ bushels

42. $125.917+

43. In questions like this and some of the preceding, where there are several conditions, it is necessary to take one condition at a time, and solve the question with regard to each separately.

If 18 men can build a piece of wall in 15 days, how many days will it take 20 men to build the same wall? It would take them $13\frac{1}{2}$ days.—If 20 men can build 40 rods of wall in $13\frac{1}{2}$ days, how long will it take them to build 87 rods of the same kind? It would take them $29\frac{2}{8}\frac{9}{0}$ days.—If 20 men can build 87 rods of wall 5 feet high in $29\frac{2}{8}\frac{9}{0}$ days, how long will it take them to build the same number of rods 8ft. high? It would take them $46\frac{4}{5}\frac{9}{0}$ days.—If 20 men can build a wall 4 feet thick in $46\frac{4}{5}\frac{9}{0}$ days, how many days will it take to build one 5 ft. thick? It will take them $58\frac{2}{4}\frac{9}{0}$ days.

It is, however, less trouble to represent the several conditions as follows:

The first condition is with regard to the number of men. 20 men will do it in $\frac{1}{2}\frac{8}{0}$ of the time that 18 men would do it. This may be represented thus, $\frac{15 \times 18}{20}$. It would take $\frac{8}{4}\frac{7}{0}$ as long on account of the length; this is expressed thus, $\frac{15 \times 18 \times 87}{20 \times 40}$. It would take $\frac{8}{5}$ as long, on account of the height. This is expressed thus, $\frac{15 \times 18 \times 87 \times 8}{20 \times 40 \times 5}$. It

would take $\frac{4}{4}$ as long, on account of the thickness. This is expressed thus, $\frac{15 \times 18 \times 87 \times 8 \times 5}{20 \times 40 \times 5 \times 4}$

This may be reduced before the operation is performed; the 15 in the numerator and 20 in the denominator are divisible by 5; 18 and 4 are divisible by 2; 5 and 5 are divisible by 5; 8 and 40 are divisible by 8. Performing these divisions, the fraction becomes $\frac{3 \times 9 \times 87 \times 1 \times 1}{4 \times 5 \times 1 \times 2}$.

Multiplying the numbers, the numerator becomes 2349, and the denominator 40, and the fraction stands thus $^{2}\frac{34}{40}{}^{9} = 58\frac{29}{40}$ as before. Ans. $58\frac{29}{40}$ days.

44. $948.88\frac{1}{3}$
45. 2808 quarters
46. 168 tailors
47. 60 measures
48. 432 tiles
49. 160632 bricks
50. 14400 shingles
51. 994 ft.
52. $51.10\frac{1}{9}$
53. $0.505 —
54. $13.09
55. $23.83
56. The gain was $10.49. It is nearly $2\frac{4}{10}$ per cent. on $437.45
57. $29.99
58. See book.

59.

yrs.	5 rates	6	yrs.	5 rates	6
1	1.05000	1.06000	11	1.71034	1.89830
2	1.10250	1.12360	12	1.79585	2.01220
3	1.15762	1.19102	13	1.88565	2.13293
4	1.21551	1.26248	14	1.97993	2.26090
5	1.27628	1.33822	15	2.07893	2.39656
6	1.34009	1.41852	16	2.18287	2.54035
7	1.40710	1.50363	17	2.29202	2.69277
8	1.47745	1.59385	18	2.40662	2.85434
9	1.55132	1.68948	19	2.52695	3.02560
10	1.62889	1.79085	20	2.65329	3.20713

60. $2.322

61. $94.35

62. $1179.915

63. 1135.88

64. $1753 +. The principal is doubled in 11 years, 10 months, and between 21 and 22 days.

65. To answer this question, the best way is to find the amount of the whole sum for the whole time, and then to find what each of the payments would amount to from the time they were made, until the 8th of July, 1822; and deduct them from the whole amount. Ans. $846.247.

66. The amount of £1 for 5 years, at six per cent. according to the table, is £1.33822; computing the interest on this for 3 months, and adding it, it amounts to £1.35829. £17 13s. 6d. = £17.675.

$$1.35829 \times 17.675 = 24.008 —$$

Ans. £24 0s. 2d.

67 - - $282.875 72. - - $0 75$\frac{5}{13}$

68. - £229 9s. 6d. 73. - - 53$\frac{3}{4}$ galls.

69. - - $0.47 74. - - 19$\frac{5}{13}$ galls.

70. - - 0.094\frac{3}{17}$ 75. - - See book

71. - - 1.484\frac{3}{13}$ 76. - - See book

77. See book

78. 10 galls. of the cheaper to 25 of the dearer; or 2 of the cheaper to 5 of the dearer

79. 5 lb. at 10 cents, 2 lb. at 13 cents, and 2 lb. at 16 cents

80. 2 parts water to 13 of rum

81. 6 " at 9s., 1 at 7s., 1 at 5s., and 3 of water

Or 1 part at 9s., 6 at 7s., 3 at 5s., and 1 of water

Or 6 parts at 9s., 6 at 7s., 3 at 5s., and 4 of water

Or 6 " at 9s., 7 at 7s., 1 at 5s., and 4 of water

82. See book

83. 20 bu. of barley, and 61$\frac{9}{11}$ of oats

84. 32$\frac{1}{4}$ galls.

85. A's loss 80$\frac{144}{467}$ tons
B's loss 54$\frac{288}{467}$ tons
C's loss 15$\frac{45}{467}$ tons

86. These fractions reduced to a common denominator are $\frac{30}{60}$, $\frac{24}{60}$, $\frac{15}{60}$, and $\frac{1}{60}$. Rejecting the denominators, the numerators show the proportions. The sum of the numerators is 77.

The wife's share is $\frac{30}{77}$ of the whole sum = 4675.32\frac{3}{7}$

The eldest son's share $\frac{24}{77}$ = 3116.88\frac{3}{7}$

The second son's " $\frac{15}{77}$ = 2337.66$\frac{1}{7}$

The daughter's " $\frac{1}{77}$ = 1870.12$\frac{6}{7}$

In this example much labour may be saved after finding the wife's share, by observing that the eldest son's share is $\frac{4}{5}$ of the wife's share, the second son's $\frac{1}{2}$ of it, and the daughter's $\frac{2}{3}$ of it.

87. { A should pay \$16.44$\frac{4}{9}$
B " \$20.55$\frac{5}{9}$

88. { A's share \$116.66$\frac{2}{3}$
B's " \$133.33$\frac{1}{3}$

89. { A 1 guinea, 15s. 6$\frac{144}{1047}$d.
B 2 guineas, 8s. 6$\frac{558}{1047}$d.
C 5 guineas, 5s. 3$\frac{819}{1047}$d.
D 10 guineas, 12s. 7$\frac{663}{1047}$d.

90.* { One of the 1st class should pay \$39.09
2d " 12.167
3d " 8.046
4th " 4.841
5th " 2.219

91. To find A's proportion,

£150 × 7 = 1050
£100 × 5 = 500
£270 × 6 = 1620

3170 = A's proportion

In the same manner find the proportions of B and C.

A = 3170
B = 3770
C = 8560

15500

They must share the gain as follows:

A $\frac{3170}{15500}$ of it = £92 0s. 7$\frac{3}{4}$d.
B $\frac{3770}{15500}$ " = £109 9s. 0$\frac{1}{4}$d.
C $\frac{8560}{15500}$ " = £248 10s. 4d.

92. *Rule for Compound Fellowship.* Multiply each man's stock by the time it is employed; each of these pro-

* This answer is what each should pay for the whole time. First find the price of 14 weeks, and divide between the 10; then of 3 weeks and divide by 14, &c.

ducts being made the numerator of a fraction, of which their sum is the denominator, will express each man's proportion of the stock to be divided.

93.	15 months	103.	$5\frac{1}{13}$ months
94.	24 months	104.	8 months
95.	120 months	105.	6 months
96.	1738 months	106.	8 months
97.	8 months	107.	$4\frac{1}{3}$ months
98.	$5\frac{17}{23}$ months	108.	$723.488
99.	16 months	109.	$691.542
100.	3 months	110.	$151.06
101.	$7\frac{11}{23}$ months	111.	$11.276
102.	$38\frac{11}{30}$ months	112.	$79.064

113. $560.173

114. A's $15. B's $35

115. Son's share $5468.75
Wife's " 7031.25

116. 3 h. 45 min. morn.

117. 45 and 50

118. $2\frac{2}{3}$ days

119. $1\frac{7}{8}$ day

120. The first could build $\frac{1}{8}$ of it in a day, the second $\frac{1}{16}$, and the third $\frac{1}{12}$ of it. They would altogether do $\frac{37}{192}$ of it in a day; and it would take them $3\frac{9}{37}$ days to do the whole. Ans. $3\frac{9}{37}$ days

121. They both together consumed $\frac{1}{12}$ of it in a day; the woman alone consumed $\frac{1}{24}$ in a day; the man alone consumed the difference between $\frac{1}{12}$ and $\frac{1}{24}$, which is $\frac{4}{132}$. It would last the man alone $33\frac{3}{4}$ days

122. $1\frac{37}{44}$ week

123. 1 h. 59 min. $37\frac{17}{19}$ sec.

124. 9 and 16

125. The elder had $8750
The younger $6250

126. Wife's share $18833.33⅓
Son's " $17333.33⅓
Daughter's $13833.33⅓

127. Take out $500, and then A's share will be equal to B's: add $300, and C's share will be equal to B. Divide this into three equal parts, and one of the parts will be equal to B's share. Having B's share, it will be easy to find the others.

A's share $12100
B's " 11600
C's " 11300

128. Sheep $8
Cow $18
Ox $36

129. 12 calves
6 sheep

130. 7 oxen, 14 cows, 42 sheep

131. Rye 5s.; wheat 8s. per bushel

132. The tallow and hide came to $7.99; this subtracted from $50 leaves $42.01 for the value of the meat. The hind quarters together weighed 440 lb.; at ½ a cent per lb. they would come to $2.20. This subtracted from 42.01 eaves $39.81. If this be divided by 873, the weight of all he quarters, it gives $0.0456 nearly, which is the price per b. of the fore quarters. The hind quarters are ½ cent per lb. more, which is $0.0506

Price of A's quarter $10.9802
" B's " 11.2838
" C's " 9.7584
" D's " 9.9864

133. A's quarter at 6¼ cents per lb. comes to $14.105; B's to $14.495; C's, at 6 cents, comes to $12.84; D's to $13.'4. The sum of these is $54.58. A must pay $\frac{14105}{54580}$

of $42.01; B $\frac{14414}{121110}$; C $\frac{13340}{121110}$; D $\frac{13110}{121110}$——A's share is $10.857; B's $11.156; C's $9.883; and D's $10.114.

134. The horse is worth 9 parts, and the saddle 1 part of $150. That is, the horse is worth $\frac{9}{10}$, and the saddle $\frac{1}{10}$ of it. Ans. Horse $135, the saddle $15

135. There are 9 cattle to 20 sheep. $\frac{9}{29}$ of the whole are cattle, and $\frac{20}{29}$ sheep. Ans. 54 cattle, and 120 sheep

136. To 1 ox, there were 3 cows and 6 sheep. $\frac{1}{10}$ of them were oxen, $\frac{3}{10}$ cows, and $\frac{6}{10}$ sheep. Ans. 8 oxen, 24 cows, 48 sheep

137. Say the fourth has 2 parts, the third 3 parts, the second 5 parts, and the first 10 parts; then the fourth will have $\frac{2}{20}$ of the whole, the third $\frac{3}{20}$, the second $\frac{5}{20}$, and the first $\frac{10}{20}$. Ans. The share of the first is $6500; of the second $3250; of the third $1950; and of the fourth $1300

138. Since B is to have 15 crowns more than A, take out 15 for B, and they have equal shares in the remainder. C is to have $\frac{1}{2}$ of both their sums added together, that is, $\frac{1}{2}$ of twice the share of A, and $\frac{1}{2}$ of 15 besides. Take out $\frac{1}{3}$ of 15, which is 3, and then he is to have of the remainder $\frac{1}{3}$ of what A and B have of it. 15 and 3, which is 18, taken from 324 leave 306; of this say A and B together are to have 5 parts and C 1 part; that is, A and B together are to have $\frac{5}{6}$ and C $\frac{1}{6}$ of 306 crowns. $\frac{1}{6}$ of 306 is 51, and $\frac{5}{6}$ is 255. $\frac{1}{2}$ of 255 is $127\frac{1}{2}$; this is A's share; 15 added to this makes $142\frac{1}{2}$; this is B's share. 3 added to 51 makes 54; this is C's share. Ans. A took $127\frac{1}{2}$ crowns, B $142\frac{1}{2}$, and C 54

139. Each person owns $\frac{4}{32}$ of the whole. A sold $\frac{3}{32}$ and had $\frac{1}{32}$ left. B sells 2 of his shares, which are divided equally among the other shares; there are now only 30 shares, and they are equal as before; therefore A owns $\frac{1}{30}$ of the whole

140. C took $\frac{11}{60}$, that is, $\frac{9}{32}$ of the whole gain; therefore he must have put in $\frac{9}{32}$ of the whole stock, and A and B to-

gether $\frac{3}{4}\frac{3}{3}$. A and B together put in $115; this is $\frac{3}{4}\frac{3}{3}$ of $160, which is the whole stock; of this C put in $45

141. See book

142. 1 cord, 1 ft. 1′ 8″

143. 306 ft. 11′ 4″

144. 2 cords, 5 ft. 7′ 5″

145. $1.203125

146. See book

147. $\frac{8}{9} = \frac{8}{12}$, and $\frac{3}{4} = \frac{9}{12}$; their ages are to each other in the proportion of 8 and 9; that is, the age of the younger is $\frac{8}{9}$ of the age of the elder; therefore 10 must be $\frac{1}{9}$ of the age of the elder. Ans. Younger 80, and the elder 90 years.

148. Observe that the third had $\frac{1}{2}$ as much as the first. The second had as much as the third and fourth, that is, $\frac{1}{2}$ as much as the first, and 5 cents; the first had as much as the second and fourth, that is, $\frac{1}{2}$ of the first, and 5 cents, and 5 cents again; or $\frac{1}{2}$ of itself and 10 cents. Therefore 10 cents is $\frac{1}{2}$ of the first. Ans. The first had 20 cents, the second 15, the third 10, and the fourth 5

149. $\frac{1}{6}$ of A's and $\frac{1}{4}$ of B's are equal to 13; multiplying by 4, $\frac{4}{6} = \frac{2}{3}$ of A's and once B's are equal to 52. Again, $\frac{1}{8}$ of A's and $\frac{1}{3}$ of B's are equal to 16; multiplying by 2, $\frac{2}{8} = \frac{1}{4}$ of A's and once B's are equal to 32. 20 then is the difference between $\frac{1}{4}$ and $\frac{2}{3}$ of A's age. The difference between $\frac{1}{4}$ and $\frac{2}{3}$ is $\frac{5}{12}$. 20 is $\frac{5}{12}$ of 48, the age of A. $\frac{1}{6}$ of 48 is 8. 8 and 5 are 13; therefore 5 is $\frac{1}{4}$ of B's age. Ans. A's age 48 years; B's 20

150. Both together were $400; $\frac{1}{4}$ of the first, and $\frac{1}{3}$ of the second were $120; multiplying by 3, $\frac{3}{4}$ of the first and once the second together were equal to $360; taking this from $400, there remains 40 for $\frac{1}{4}$ of the first. Ans. First $160, and the second $240

151. The whole of the money of the second, and $\frac{1}{3}$ of that of the first is $4200; multiply the first condition by 3,

the whole of the money of the second, and three times that of the first is $12600; taking $4200 from this, there remains $8400; this is the difference between $\frac{1}{5}$ of the first and three times the first; that is, $\frac{14}{5}$ of the first. $8400 is $\frac{14}{5}$ of $3000, which is the money of the first. Ans The first had $3000, and the second $3600

152. He bought 4 at 2 cents each, as often as he bought 3 at 3 cents each. 4 at 2 cents came to 8 cents, and 3 at 3 cents came to 9 cents; therefore every 7 lemons cost 17 cents, which is $2\frac{3}{7}$ cents each. He sold them at $2\frac{1}{2}$ cents each. The difference between $2\frac{3}{7}$ and $2\frac{1}{2}$ is $\frac{1}{14}$. He gained $\frac{1}{14}$ of a cent on each lemon, that is 1 cent on 14 lemons. To gain 25 cents, he must have had 25 times 14 lemons. $\frac{4}{7}$ of them cost 2 cents, and $\frac{3}{7}$ cost 3 cents each. Ans. 350 lemons

153. $8\frac{4}{7}$ barrels

154. He received five times as much as he spent, and then he had 200 dollars; if he had received as much as he spent, he would have had as much as he had at first, viz. $100. The other $100 then must be four times what he spent. Ans. $25

155. Each son had $\frac{5}{22}$ of the whole estate, and each daughter $\frac{4}{22}$ of it. The two sons together had $\frac{10}{22}$, and the three daughters $\frac{12}{22}$; the difference is $\frac{2}{22}$. $1000 therefore is $\frac{2}{22}$, and $500 is $\frac{1}{22}$ of the whole estate. Ans. The share of a son was $2500

156. Take $\frac{1}{3}$ of the whole for the wife, and $\frac{1}{3}$ for the son. Then, of the other $\frac{1}{3}$, the daughter has 3 parts, and the wife 1 part, that is, the daughter has $\frac{3}{4}$ of $\frac{1}{3} = \frac{3}{12}$ of the whole. The son had $\frac{4}{12}$. The difference is $\frac{1}{12}$. Therefore $1000 is $\frac{1}{12}$ of the whole. Ans. The wife had $5000; the son $4000; and the daughter $3000

157. If he had bought 3 less for the same money, the price of each orange would have been once and one half as

much; consequently, if he had bought the same number at the latter price, they would have come to $37\frac{1}{2}$ cents. Three oranges then would have come to $12\frac{1}{2}$ cents. Hence 3 oranges must have been $\frac{1}{3}$ of the number that he bought. Ans. He bought 9 oranges, at $2\frac{7}{9}$ cents each

158. Say the first had 6 parts, the second 4 parts, and the third 3 parts. The first had $\frac{6}{13}$, the second $\frac{4}{13}$, and the third $\frac{3}{13}$. The second and third together had $\frac{7}{13}$ of the whole. \$1500 is $\frac{7}{13}$ of the whole, which is $\$2785.71\frac{3}{7}$. Ans. The first had $\$1285.71\frac{3}{7}$, the second $\$857.14\frac{2}{7}$; and the third $\$642.85\frac{5}{7}$

159. Double the second condition, and say, he had 16 bushels of corn and 20 of rye for \$30; and 48 bushels of corn and 20 of rye for \$54. The difference between \$30 and \$54 (which is \$24) must be the price of 32 bushels of corn, which is \$0.75 per bushel. Ans. Corn \$0.75, and rye \$0.90 per bushel

160. He had travelled 42 parts of the distance, and had 25 parts to travel; that is, he had travelled $\frac{42}{67}$ of the distance, which is 210 miles. Ans. 30 miles per day

161. The second had as much as the first, and $\frac{1}{3}$ as much as the third. Taking the last conditions, the second had 1 part, while the third had 3 parts. The third had as much as the other two; the first part of the second balances one part of the third; then of the other 2 parts, one will balance what the first had, and the other the part which the second had, that was equal to the first. Therefore the first had 1 part, the second 2 parts, and third 3 parts; that is, $\frac{1}{6}$, $\frac{2}{6}$, and $\frac{3}{6}$. \$2000 is $\frac{1}{6}$ of the whole. Ans. The second had \$4000, and the third \$6000

162. When they were married, her age was 1 to his 3; after 15 years, hers is 2 to his 4. It appears that her age was doubled, and his had become $\frac{4}{3}$ of what it was. Hence

her age was 15, and his was 3 times 15 or 45 years when they were married. Ans. Man 45, and wife 15 years

163. $1.35 per gall.

164. A had gained a sum equal to $\frac{1}{4}$ of his stock; he had then $\frac{5}{4}$ of it. B had only $\frac{1}{2}$ as much, that is $\frac{5}{8}$ of his stock, consequently $225, which he had lost, was $\frac{3}{8}$ of his stock. Ans. $600 each

165. If to $\frac{1}{2}$ the body, 16 inches be added, it makes the length of the tail; if to this 16 inches more be added, it makes the body, that is, $\frac{1}{2}$ the body and 32 inches make the whole body. The body then is 64 inches, and the whole 128 inches. Ans. 128 inches

166. If to $\frac{2}{7}$ of the age of C 20 be added, it makes the age of B; if to this 20 be added again, it makes the age of C; that is, 40 and $\frac{2}{7}$ of itself makes the age of C; 40 then is the other $\frac{5}{7}$. 40 is $\frac{5}{7}$ of 56. Ans. B 36, and C 56 years

167. If the second be covered, it will weigh three times the first, that is 36 oz. The cover and the second cup together therefore weigh 36 oz. If the first cup be covered, it will weigh twice as much as the second; therefore if both the cups and the cover be taken together, the first cup and the cover will be $\frac{2}{3}$, and the second $\frac{1}{3}$ of it. The whole together weigh 48 oz.; $\frac{1}{3}$ of this is 16 oz.; this is the weight of the second cup, consequently the cover must weigh 20 oz. Ans. Cover 20 oz. and second cup 16 oz.

168. The first and second do $\frac{7}{9}$ of it, consequently the third does the other $\frac{2}{9}$ of it. The second and third do $\frac{7}{11}$ of it, consequently the first does $\frac{4}{11}$. $\frac{4}{11}$ and $\frac{2}{9}$ are $\frac{58}{99}$. The first and third together do $\frac{58}{99}$ of it, consequently the second does the other $\frac{41}{99}$. Ans. $\frac{41}{99}$

169. The apples cost $\frac{5}{12}$ of a cent each. There were 8 apples to 5 pears. 8 apples cost $\frac{40}{12} = \frac{10}{3}$ cents, and 5 pears cost the same; therefore 8 apples and 5 pears cost $\frac{20}{3}$ of a cent, which will average $\frac{20}{39}$ of a cent apiece. He gained $\frac{19}{39}$

on each, consequently he gained 19 cents on 39. $\frac{6}{13}$ of these were apples, which is 24; this is half what he bought. Ans. He bought 48, and gave 20 cents for them

170. In going once round the dial plate, the minute hand gains 55 minutes or spaces; consequently it would take it $\frac{60}{55} = 1\frac{1}{11}$ minute to gain 1 minute or space, and to gain 35 it would take 35 times as long, that is, $38\frac{2}{11}$ min. Ans. 7 h. $38\frac{2}{11}$ min.

171. This is to divide 12 into 2 parts, in the proportion of 5 and 17. The first part will be $\frac{5}{22}$ of 12. Ans. 2 h. 43 min. $38\frac{2}{11}$ sec.

172. Reducing the fractions to a common denominator $\frac{7}{6}\frac{8}{3}$ of the time past is equal to $\frac{14}{6}\frac{4}{3}$ of the time to come, or the time past equal to $\frac{14}{27}$ of the time to come. $\frac{14}{41}$ of 12 hours will be the time. Ans. 4h. 5 min. 51 $\frac{9}{41}$ sec.

173. He sold $\frac{1}{4}$ of his linen and $\frac{1}{5}$ of his cotton for $12, by which he gained $0.60. Hence this quantity cost him $11.40. Multiplying this condition by 4, all his linen and $\frac{4}{5}$ of his cotton must have cost him $45.60. Subtracting this from $50, the price of the whole, there remains $4.40 for the price of $\frac{1}{5}$ of the cotton. The cotton cost $22; consequently the linen cost $28; 5 times 22 are 110, the number of yards of the cotton; 3 times 28 are 84, the number of yards of linen. Ans. 110 yds. of cotton, and 84 yds. of linen.

174. A's share is $\frac{8}{9}$ of B's, and C's share is $\frac{4}{7}$ of B's. The difference between $\frac{8}{9}$ and $\frac{4}{7}$ is $\frac{36}{63}$, therefore the difference between the shares of A and C is $\frac{36}{63}$ of B's share; hence $7500 is $\frac{36}{63}$ of B's share.

Ans. A's share is 11666\frac{2}{3}$, B's 7291\frac{2}{3}$ and C's 4166\frac{2}{3}$

175. Beginning at the end of the 3d year, subtract $150 from 14811\frac{7}{18}$, and the remainder 14661\frac{7}{18}$ is $\frac{5}{6}$ of what it was at the beginning of the year, that is, 11729\frac{1}{2}$. From this subtract $150 again, and the remainder will be $\frac{5}{6}$ of what it was at the beginning of the first year; that is

$9263\frac{1}{4}\frac{3}{7}$. From this subtract $150, and the remainder is $\frac{4}{5}$ of his first stock. Ans. 7290\frac{1}{2}\frac{1}{3}\frac{1}{7}$

176. While the grey-hound takes 3 leaps the hare takes 4, therefore while the grey-hound takes 1 leap the hare takes $1\frac{1}{3}$, and while the grey-hound takes 2 leaps the hare will take $2\frac{2}{3}$ leaps; but the grey-hound leaps as far at 2 leaps as the hare does at 3, therefore in taking 2 leaps he gains $\frac{1}{3}$ of one of of the hare's leaps, that is, $\frac{1}{6}$ at each leap; hence he will overtake her at 6 times 50 or 300 leaps. Ans. 300 leaps

177. If he had worked the whole time, he would have received $90, but he lost $15 out of this. Now the difference between working and being idle was $2 a day. Hence he was idle $7\frac{1}{2}$ days. Ans. $52\frac{1}{2}$ days

178. In 8 years he gets £40 in debt, that is, £5 a year; therefore he spends £5 more than his income. A spends $\frac{4}{5}$ of his, and B spends £5 more than $\frac{4}{5}$. Hence £25 must be $\frac{1}{5}$ of his income. Ans. £125

179. Spouting from his throat he would fill at the rate of $\frac{1}{8}$ of the cistern in an hour, from his right eye he would fill $\frac{1}{4}\frac{1}{8}$ of it in an hour, from his left eye he would fill $\frac{1}{7}\frac{1}{2}$ of it in an hour, from his right foot he would fill $\frac{1}{4}$ of it in an hour. All these together make $\frac{6}{1}\frac{5}{4}\frac{5}{4}$; hence, all spouting together, he would fill $\frac{6}{1}\frac{5}{4}\frac{5}{4}$ of it in an hour; 65 is contained in 144 $2\frac{1}{6}\frac{4}{5}$ times. Ans. 2 h. 12 min. $55\frac{5}{1}\frac{5}{3}$ sec.

180. After the fourth game, twice his money was as much less than 200s. as three times his money was greater than 200s.; hence 200s. was $2\frac{1}{2}$ or $\frac{5}{2}$ his money. 200 is $\frac{5}{2}$ of 80, to that add 20, and it will make what he had at the end of the third game. $80 + 20 = 100$; $\frac{1}{2}$ of 100 or 50 is what he had after the second game. $50 + 10 = 60$ is what he had after the first game, and $\frac{1}{2}$ of 60 or 30 is what he commenced with. Ans. 30s.

181. 15.708ft.

182. 5.41ft.

183.—187. See book
188. 24855.412 miles
189. 1035.6 miles
190. 69.043 miles
191. 15 degrees
192. 15 min. of a degree
193. 1 h. 34 min. 52 sec.
194. 4 h. 27 min. 16 sec.
195. 0 h. 36 min. 28 sec. even.
196. 68093 miles nearly
197. 1433.8 miles. Lat. of Boston 42° 23′ nearly
198. 2487.45 miles
199. $61.035
200. £34 12s.
201. $160.03
202. 1532 francs, 90$\frac{1}{2}$ centimes
203. $209.20
204. 246 $\frac{12}{16}$ gelders.
205. $391

THE END.